PLANMECA

ProMax X-ray
with Dimax3

USER'S MANUAL

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1 INTRODUCTION

The Planmeca ProMax X-ray unit uses panoramic, linear tomographic and cephalometric techniques to produce X-ray images for the diagnosis of dentomaxillofacial anatomy. The unit is allowed to be used only under supervision of a dental/health care professional.

This manual describes how to operate the Planmeca ProMax X-ray unit equipped with the Planmeca Dimax3 digital sensor head. Please read these instructions thoroughly before using the unit.

NOTE ***You need a PC with the Dimaxis imaging software program in order to save, view and modify the radiographs. The Dimaxis software program has a separate manual that should be used in conjunction with this manual.***

NOTE ***The optional ProMax Cephalostat has a separate manual that should be used in conjunction with this manual.***

CE 0537

The ProMax X-ray unit fulfills the requirements of Directive 93/42/EEC.

The ProMax X-ray unit fulfills the requirements of standard EN 55011, class A.

CAUTION ***Federal law restricts this device to sale by or on the order of a dentist.***

NOTE ***The unit's software revision is shown briefly on the control panel when the unit is switched on. This manual is valid for software revision 1.19.5 or later. This software revision is compatible with Dimaxis software revision 3.3.1 or later.***

The display values shown in this guide are only examples and should not be interpreted as recommended values unless otherwise stated.

The exposure values required to produce good X-ray images will vary considerably according to the build and age of the patient. Therefore, the exposure values given in this guide are average values and are only meant to guide the user. Users are encouraged to develop their own radiographic techniques based on these values.

The kV value can be reduced by 2 kV from the suggested value to improve the image contrast. The radiation dose (mA) can be reduced by 20-40% without significantly lowering the image quality.

Make sure that you are fully acquainted with the appropriate radiation protection measures and these instructions before using the unit.

1.1 Unit symbols

En: Type B applied part (Standard IEC 60601-1)

Fr: Partie appliquée du type B (norme CEI 60601-1)

En: Alternating current (Standard IEC 60417)

Fr: Courant alternatif (norme CEI 60417)

En:
Attention, consult accompanying documents (Standard IEC 60601-1)

Fr:
Attention, consulter les documents d'accompagnement (norme CEI 60601-1)

En:
X-ray source assembly, emitting (Standard IEC 60417)

Fr:
Ensemble radiogène à rayonnement X, en émission (norme CEI 60417)

En: Temple supports

Fr: Système de contention des tempes

Electrostatic sensitive device (Standard IEC 60417)

Separate collection for electrical and electronic equipment according to Directive 2002/96/EC (WEEE).

The manufacturer, assembler, and importer are responsible for the safety, reliability and performance of the unit only if:

- installation, calibration, modification and repairs are carried out by qualified authorized personnel
- electrical installations are carried out according to the appropriate requirements such as IEC364
- equipment is used according to the operating instructions

Planmeca pursues a policy of continual product development. Although every effort is made to produce up-to-date product documentation this publication should not be regarded as an infallible guide to current specifications. We reserve the right to make changes without prior notice.

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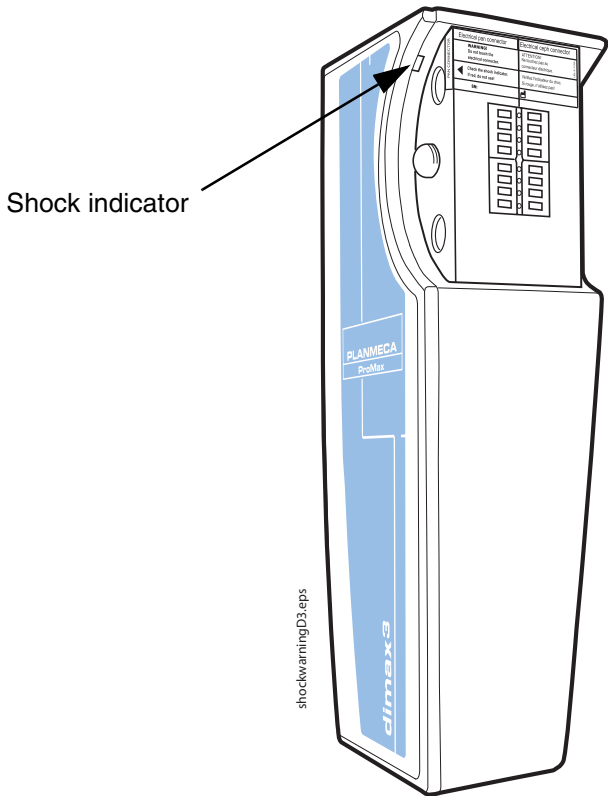
2 WARNINGS AND PRECAUTIONS

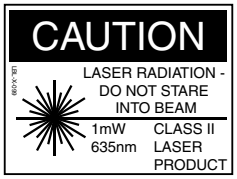
NOTE ***IT IS VERY IMPORTANT THAT THE PLACE WHERE THE UNIT IS TO BE USED AND THE POSITION FROM WHICH THE USER IS TO OPERATE THE UNIT ARE CORRECTLY SHIELDED. SINCE RADIATION SAFETY REQUIREMENTS VARY FROM COUNTRY TO COUNTRY AND STATE TO STATE IT IS THE RESPONSIBILITY OF THE USER TO ENSURE THAT ALL LOCAL SAFETY REQUIREMENTS ARE MET.***

CAUTION ***This X-ray unit may be dangerous to both patient and operator unless safe exposure values are used and correct operating procedures are observed.***

NOTE ***If the X-ray unit has been stored at temperatures under +10°C for more than a few hours, time must be allowed for the unit to reach room temperature before turning it on.***

CAUTION ***Use the DIMAX3 digital X-ray system according to the instructions given in this manual. <u>Do not drop the sensor head.</u> The Planmeca limited warranty does not cover damage which is due to misuse, e.g. dropping the sensor head, neglect, or any cause other than ordinary application.***
Do not use the sensor head if the shock indicator located on the sensor head is red - contact your local support for help.
If you have any reason to believe that the sensor might be faulty, take a test exposure before taking a patient exposure.





NOTE FOR US USERS:

The patient positioning lights are class II laser products (21 CFR § 1040.10).

NOTE FOR EUROPEAN USERS:

Class 1 laser product (Standard EN 60825-1: 1994).

The patient positioning lights are class 1, inherently safe laser lights.

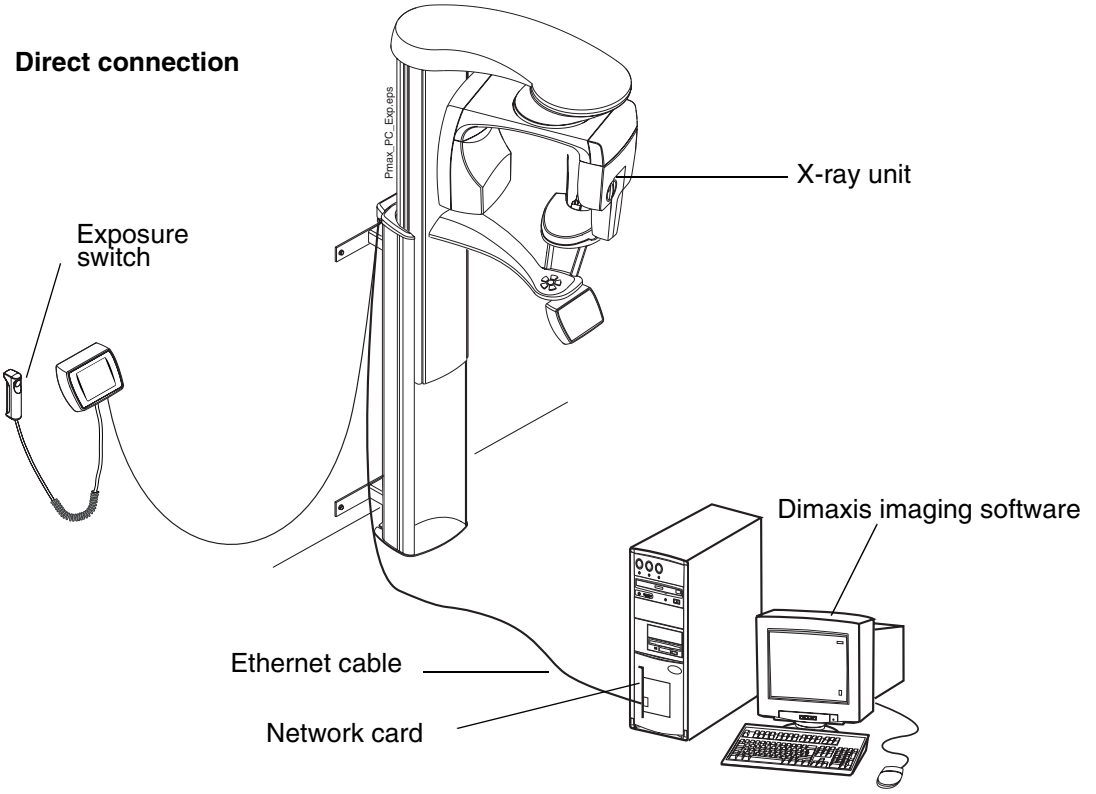
NOTE ***EMC requirements have to be considered, and the equipment must be installed and put into service according to the specific EMC information provided in the accompanying documents.***

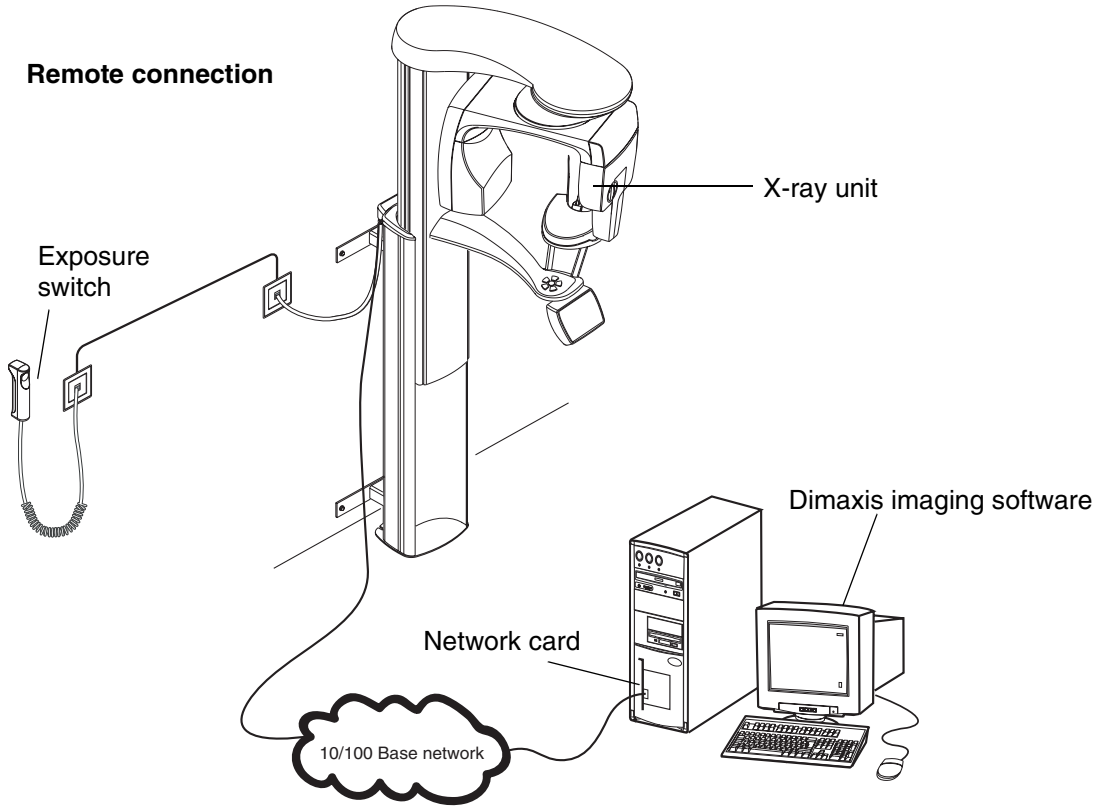
NOTE ***Portable and mobile RF communications equipment can affect Planmeca ProMax X-ray unit.***

NOTE ***Never place heavy objects on any part of the unit or hang objects from the unit's arm structures.***
Do not put containers of liquid on any part of the unit.

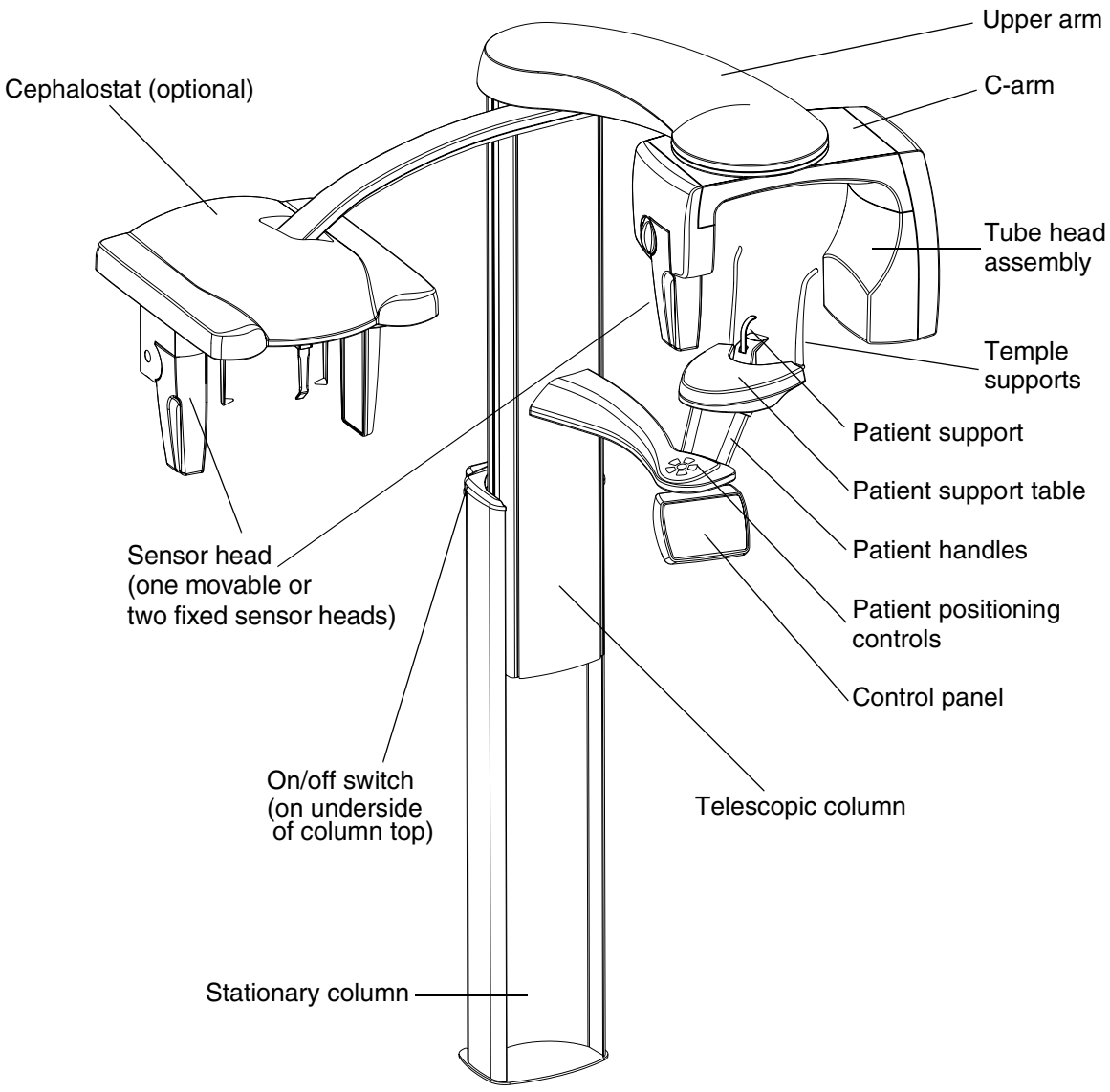
3 DIGITAL PROMAX X-RAY SYSTEM - MAIN PARTS

General view of the system



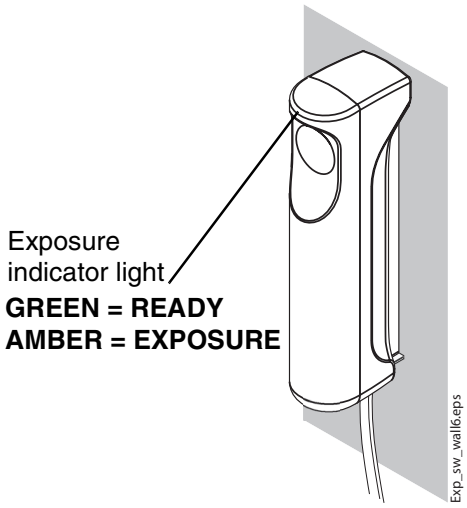


General view of the X-ray unit



NOTE ***ProMax utilizes the new SCARA (Selectively Compliant Articulated Robot Arm) technology for arm movements. SCARA3 robot arm units have three joints. SCARA2 robot arm units have two joints.***

Exposure switch



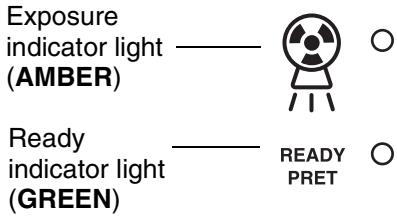
The exposure switch can be mounted on the wall, or it can be hung from the hook provided on the stationary column top if a protected area is within reach.

On the exposure button and on the control panel a green indicator light will come on when the unit is correctly set up and ready to take an exposure. Additionally, the word READY will be shown on the control panel display.

An amber indicator light will come on on the exposure switch and on the control panel when you take an exposure. It indicates that the unit is generating radiation. Additionally, you will hear a radiation warning signal.

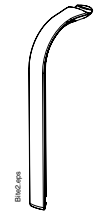
When you take an exposure you must press and **hold down** the exposure button for the whole duration of the exposure. If you remove your finger from the exposure button before the exposure cycle is completed radiation is interrupted, the C-arm will stop moving and an error message will appear on the control panel display. The error message must be cleared from the display before the unit can be used again. To clear the message, touch the *OK* field.

CONTROL PANEL LIGHTS:

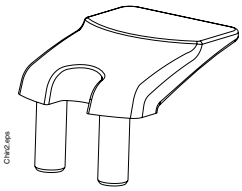


NOTE ***Refer to section 18.5 "Connecting the exposure switch cable" on page 108 for information on how to connect the exposure switch to the unit.***

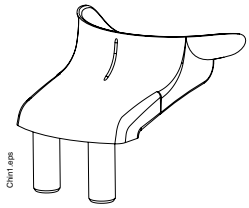
Patient supports



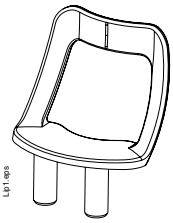
Bite piece



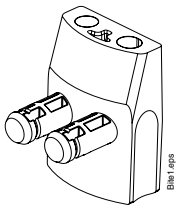
Chin rest



Chin cup



Chin support



Adapter

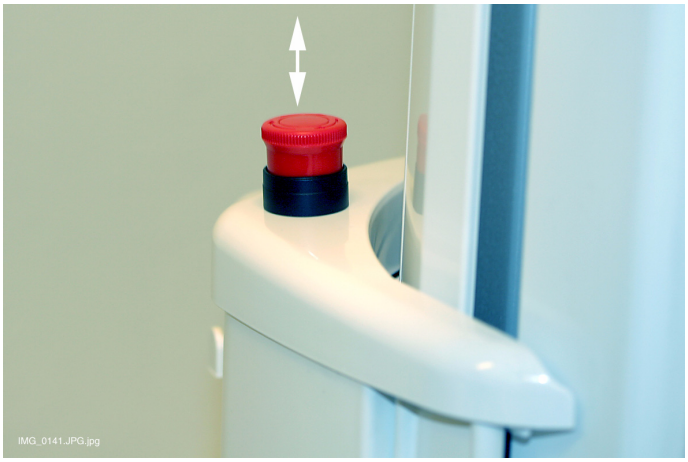
Emergency stop button

When driving the X-ray unit from one position to another care should be taken. In case of an emergency press the stop button on top of the stationary column to stop the possible on-going exposure and up/down movement of the X-ray unit.

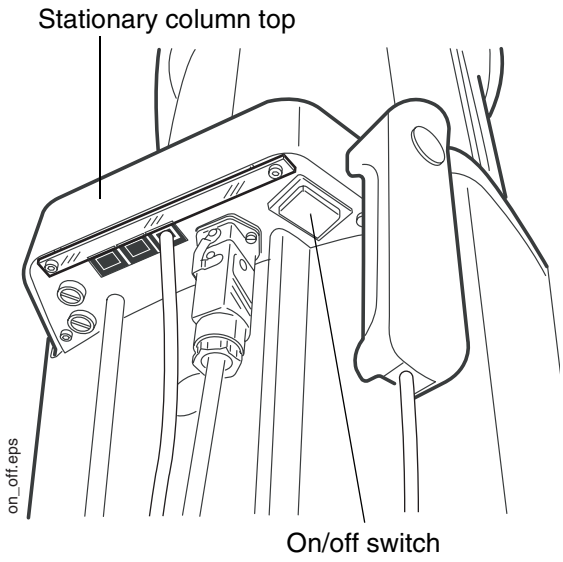
HE 141 appears in the display.

Pull up the emergency stop button. The X-ray unit will be automatically rebooted. The X-ray unit is ready for use again.

Press and pull up



4 SWITCHING THE UNIT ON



The on/off switch is located on the underside of the stationary column top. When you switch the unit on the main display will be shown on the control panel and the unit will carry out a self-test which will last a few seconds.

The unit is then ready for use.

NOTE ***The unit incorporates a self-checking feature that monitors the operation of the unit. If there is a malfunction or an operating error the unit will stop working and an error message will appear on the control panel. The error message must be cleared from the display before the unit can be used again. To clear the message, touch the OK field.***

NOTE ***A help message is shown on the control panel if the selected function is not allowed. The help message disappears when you cancel the action or release the exposure button.***

5 PROGRAMS

The Planmeca ProMax Dimax3 includes a set of programs, which provides a selection of exposure formats for all types of patients and diagnostic purposes. The programs are divided in three main groups: basic programs, advanced programs and tomographic programs. Apart from these groups, there are some individual special programs.

In the table below the programs are divided according to the sales packages. However, in the following chapters the programs will be presented according to the program type.

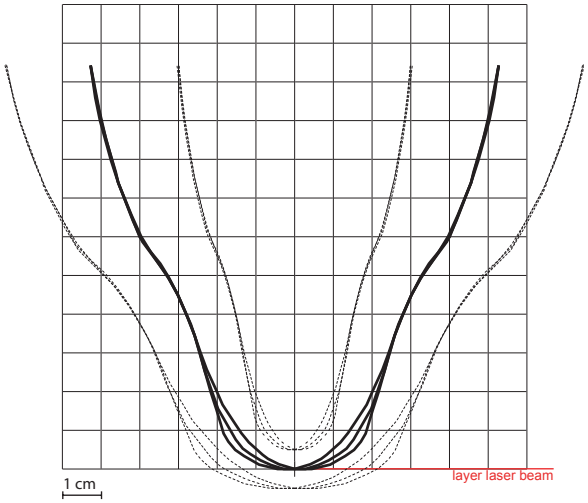
Program	
Basic programs (standard)	Standard adult panoramic
	Standard child panoramic
	Lateral double TMJ
	PA double TMJ
	Sinus
Advanced programs (optional)	Horizontal segmenting
	Improved orthogonality panoramic
	Improved interproximal angulation panoramic
	Bitewing panoramic
	Lateral PA double TMJ
	Lateral multiangle TMJ
	PA multiangle TMJ
	PA non-rotational sinus
	Lateral non-rotational sinus
Other programs (optional)	Magnification correction panoramic
	Vertical segmenting
Tomography (optional)	Digital tomography
	Linear tomography
	True linear tomography

See chapter 8 “CONTROL PANEL” on page 34 for information on how to enter the desired program.

5.1 Panoramic exposure programs

5.1.1 Standard panoramic exposure program

Size and shape of focus area



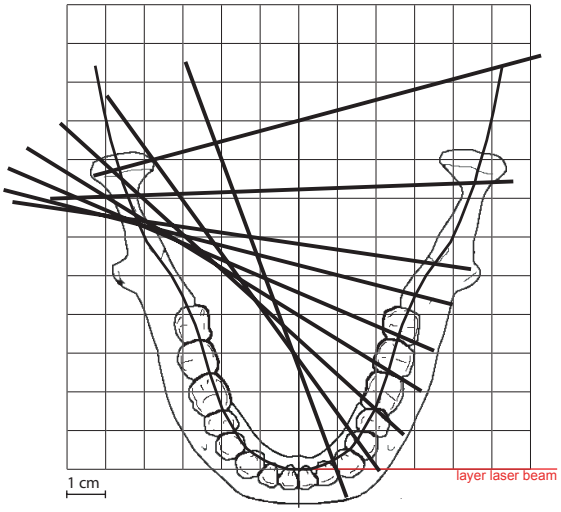
The standard panoramic exposure program is included in the basic programs package.

The standard panoramic program has a traditional path and angles of the beam.

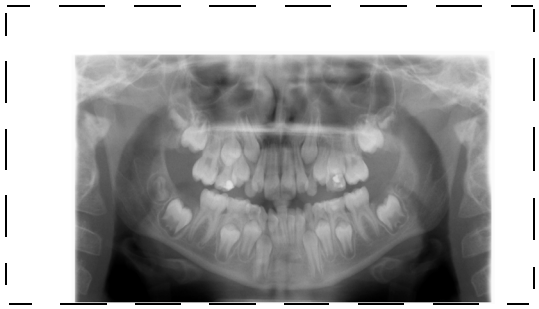
If the patient is a child or a very small adult, you can select the child setting for the exposure. In child setting the width and height of the exposed area will be reduced by 28 per cent, see pictures below.

Adult

Direction of beam

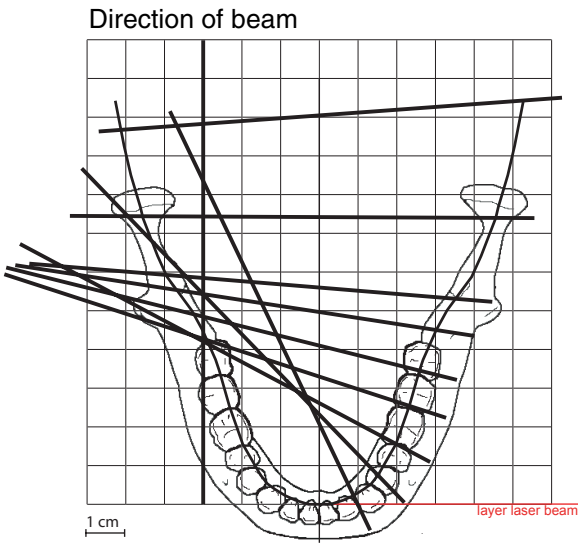


Child



5.1.2 Advanced panoramic exposure programs

Improved orthogonal panoramic program

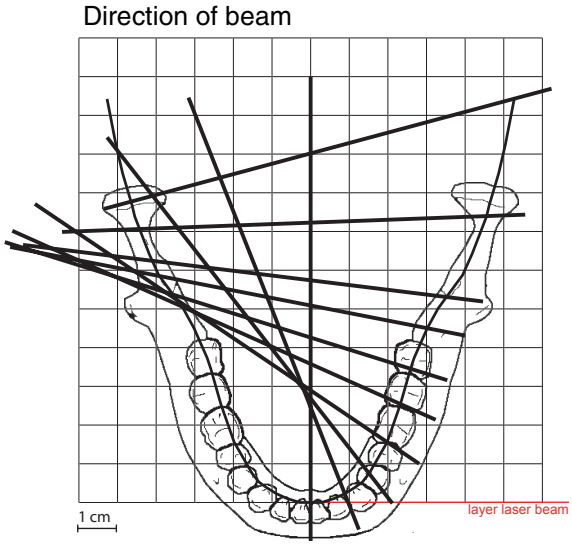


The basic imaging geometry is the same as in the standard program but the X-ray beam is perpendicular to the jaw.

This program is useful for implant planning.

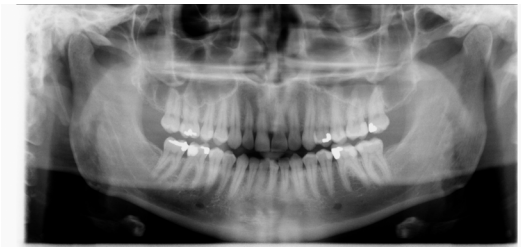
NOTE ***This program is optimized for orthogonal imaging and the radiograph may have a projected shadow of the opposite side teeth.***

Improved interproximal panoramic program



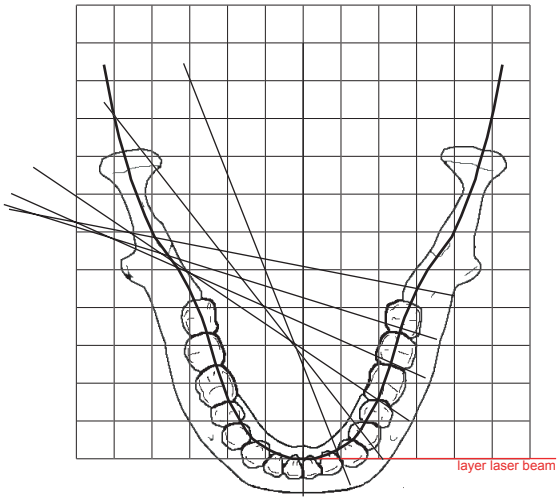
The basic imaging geometry is the same as in the standard program but the X-ray beam is parallel to the interproximal contacts of the teeth.

This program is used for caries detection.



NOTE ***This program is optimized for interproximal imaging and the radiograph may have a projected shadow of the opposite side teeth.***

Bitewing panoramic program



This program produces bitewing-like images from premolar and molar areas including parts of maxilla, mandible and rami.

The bottom of the maxillary sinus and as well as the mandibular canal and the mental foramen are also visible.

The bitewing program uses improved interproximal angulation projection geometry.

Using the bitewing program reduces the radiation dose by 50% compared to the normal panoramic program.

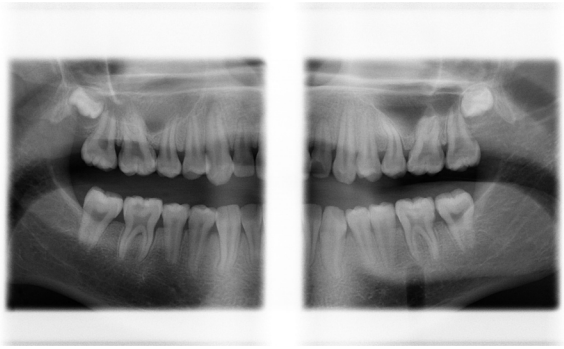


Image sizes of the panoramic programs

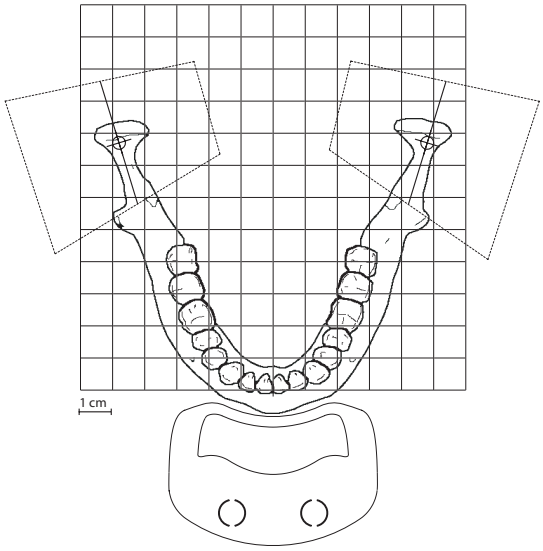
Program		Real size (W x H) mm	Size on receptor (W x H) mm	Magnification	Layer thickness (mm)
Panoramic	adult	225 x 108	270 x 130	1.2x	10 - 48
	child	192 x 92	230 x 110		
Bitewing panoramic	adult	67 x 145	100 x 218	1.5x	10 - 26
	child	56 x 120	84 x 180		

5.2 Temporomandibular joint (TMJ) exposure programs

The TMJ programs provide exposures of patient's left and right temporomandibular joints. There are altogether seven TMJ exposure programs. Two of them, the lateral double TMJ and the posteroanterior double TMJ exposure program, are included in the standard programs. The other three advanced programs are optional.

5.2.1 Standard TMJ programs

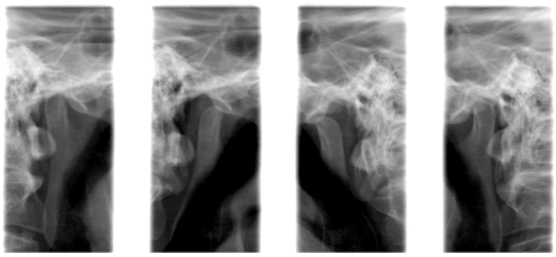
TMJ double, lateral

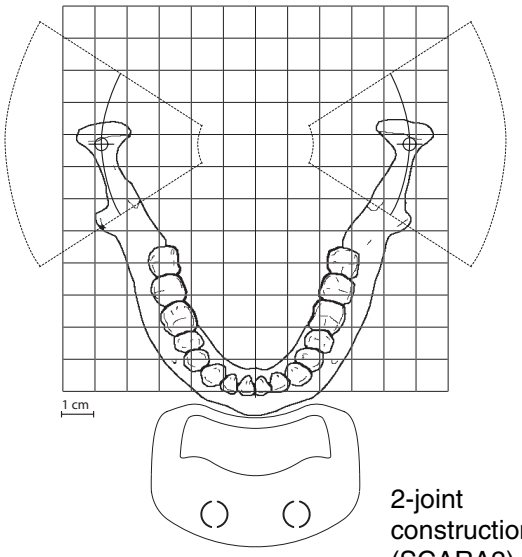


Lateral TMJ exposures of open and closed temporomandibular joints.

Default angle: 17°.

The target area and angle can be adjusted in units with 3-joint construction (SCARA3).

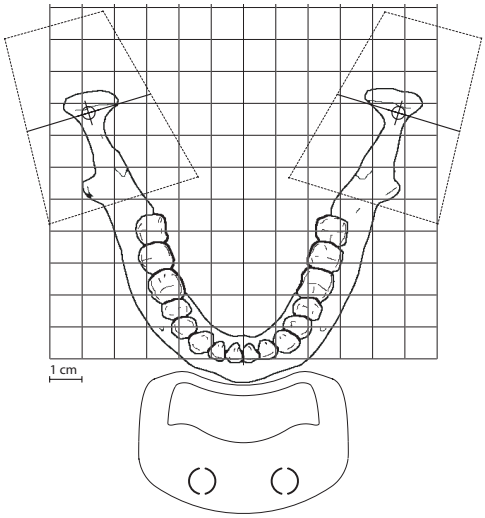




2-joint construction (SCARA2)

The geometry is different in SCARA2 units. The imaging area can only be adjusted with the patient size selection.

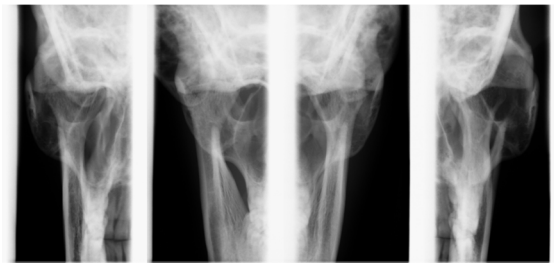
TMJ double, PA

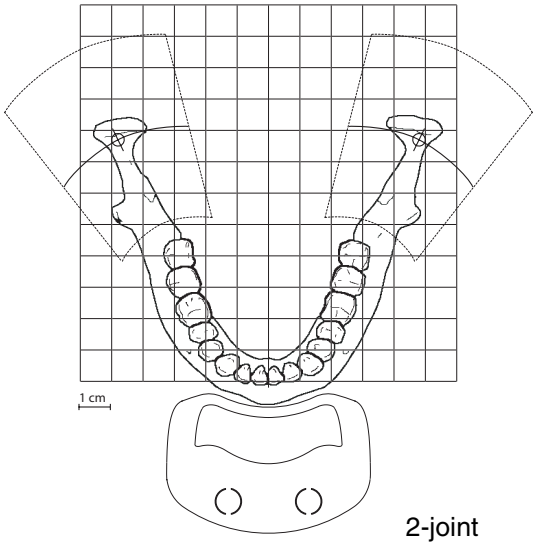


Posteroanterior TMJ exposures of open and closed temporomandibular joints.

Default angle: 73°.

The target area and angle can be adjusted in units with 3-joint construction (SCARA3).



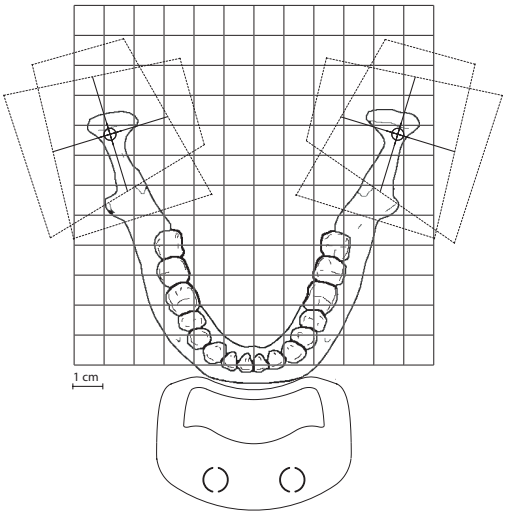


2-joint construction (SCARA2)

The geometry is different in SCARA2 units. The imaging area can only be adjusted with the patient size selection.

5.2.2 Advanced TMJ programs

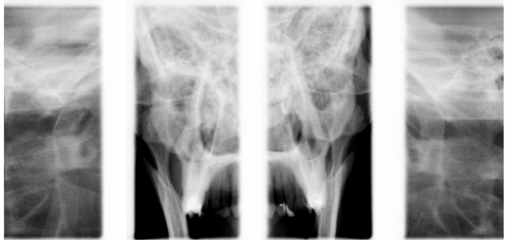
TMJ double, lat-PA



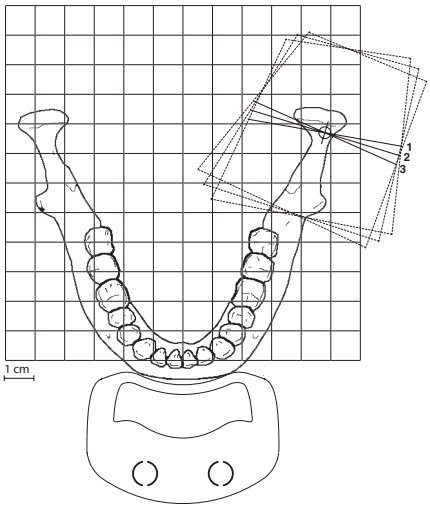
Lateral and posteroanterior TMJ exposure of open or closed temporomandibular joints.

Default angle: 73°/17°.

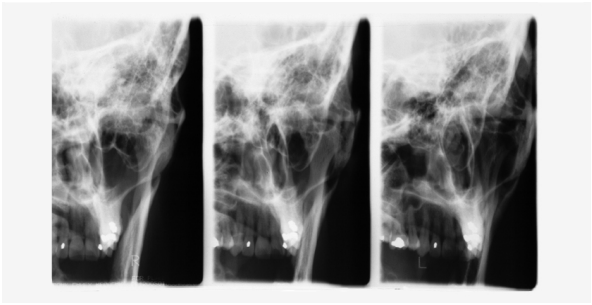
The target area and angle can be adjusted in units with 3-joint construction (SCARA3).



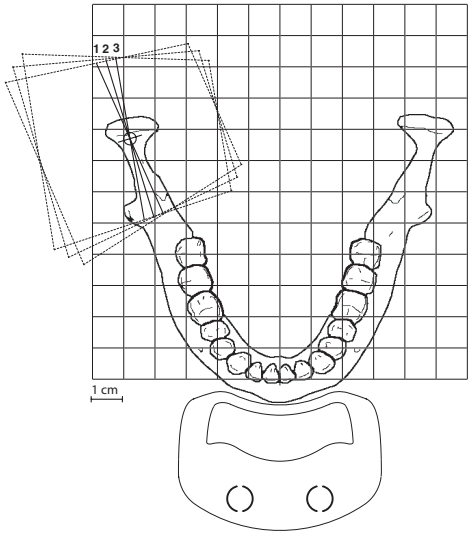
3 angles, PA L or R



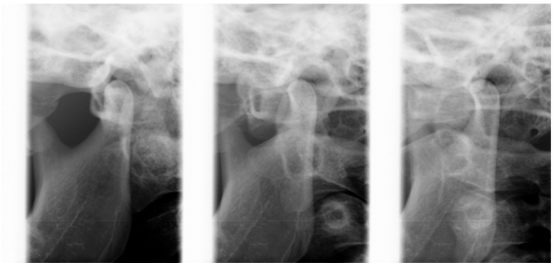
Three posteroanterior multi-angle left-hand or right-hand side TMJ exposures (three angles 73° ±7°).



3 angles, lat L or R



Three lateral multi-angle left-hand or right-hand side TMJ exposures (three angles 17° ±7°).



ProMax TMJ image sizes

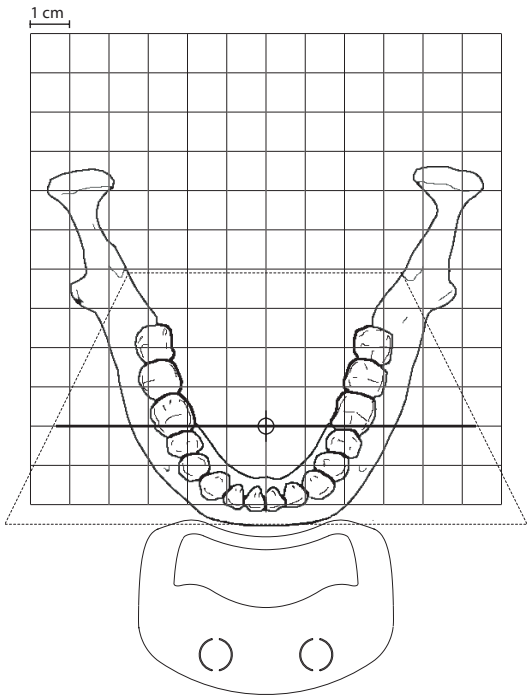
Program		Real size (W x H) mm	Size on receptor (W x H) mm	Magnification	Layer thickness mm
TMJ double lat	adult	45 x 97	60 x 130	1.34 x	60
	child	45 x 82	60 x 110		
TMJ double PA	adult	41 x 90	60 x 130	1.45 x	60
	child	41 x 76	60 x 110		
TMJ double lat scara2	adult	40 x 87	60 x 130	1.5 x	60
	child	40 x 73	60 x 110		
TMJ double PA scara 2	adult	40 x 87	60 x 130	1.5 x	60
	child	40 x 73	60 x 110		
TMJ 3 angles	adult	53 x 87	80 x 130	1.5 x	60
	child	53 x 73	80 x 110		

5.3 Sinus exposure programs

The Sinus programs provide a view of the maxillary sinuses.

5.3.1 Standard Sinus exposure program

Sinus PA rot

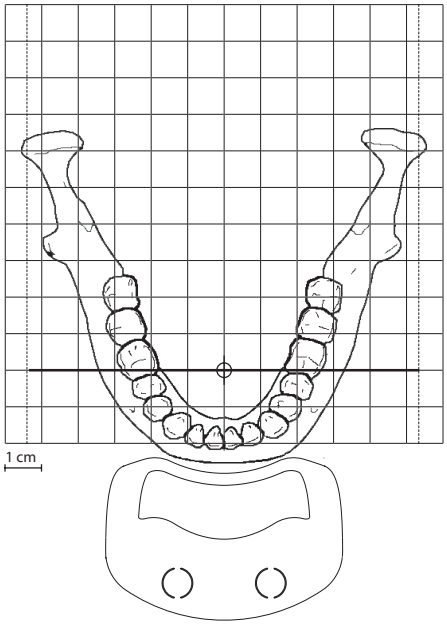


The Sinus PA rot, posteroanterior rotational, exposure program is included in the standard package.

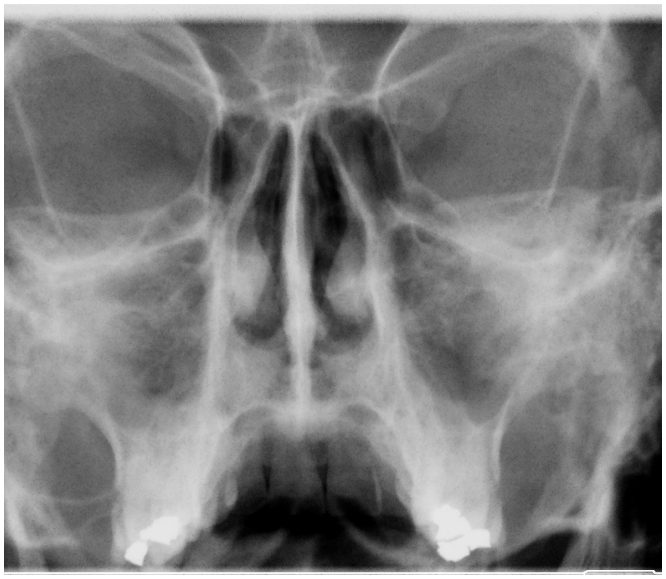
The rotational exposure means that the C-arm of the unit makes a rotational movement, thus forms an image layer.

5.3.2 Advanced Sinus exposure programs

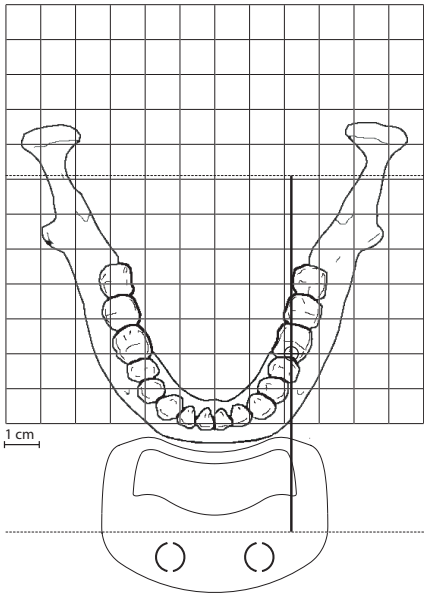
Sinus PA nonrot



Posteroanterior non-rotational sinus exposure.
The non-rotational indicates that the C-arm moves linearly and scans over the head with a linearly moving X-ray beam. The exposed image is a transillumination image like in Cephalostat.

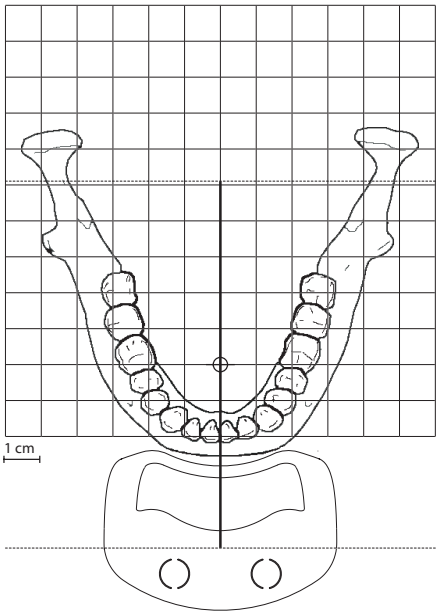


Lateral non-rotational L & R Sinus program



Lateral sinus left-hand and right-hand side exposures.

Midsagittal non-rotational L & R sinus program

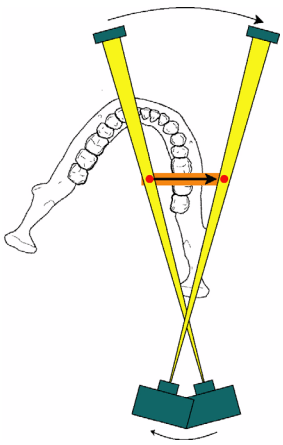


Lateral midsagittal sinus left-hand and right-hand side exposures.

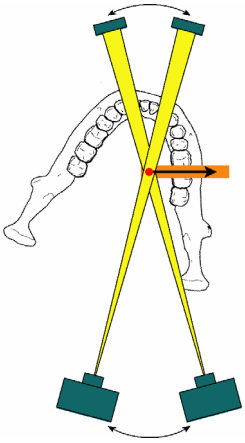
ProMax Sinus image sizes

Program		Real size (W X H) mm	Size on receptor (W x H) mm	Magnification	Layer thickness mm
Sinus PA rotational	adult	114 x 93	160 x 130	1.4 x	65
	child	114 x 79	160 x 110		
Sinus PA non-rotational	adult	120 x 96	160 x 130	1.35 x	∞
	child	120 x 81	160 x 110		
Sinus lateral non-rotational	adult	102 x 96	138 x 130	1.35 x	∞
	child	102 x 81	138 x 110		

5.4 Tomographic exposure programs



Tomography



Transtomography

There are two tomography methods available: **digital tomography** and **digital transtomography**.

Digital tomography uses one sweep method. The narrow X-ray beam makes one sweeping movement and the rotation centre moves simultaneously along the image layer. The layer thickness is always 6mm.

Digital transtomography uses multiple sweep method. During the transitional movement along the image layer the X-ray beam makes also pendular movement back and forth. The layer thickness can be adjusted.

NOTE ***Vertical artefacts, caused by high contrast anatomies outside the layer, may occur in transtomography when 1mm layer thickness is used. Select a thicker layer to avoid this.***

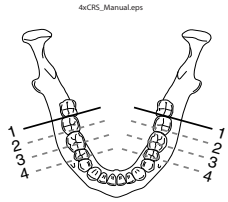
	Digital tomography	Transtomography
Layer thickness, mm	6	1, 3, 6, 9, 18, 36
Layer separation	Worse	Better
Exposure time/frame, (sec.)	3	24
Patient dose	Lower	Higher (~2x)

Patient positioning in both systems is exactly the same but the recommended exposure values are different.

5.4.1 Tomographic exposure programs

The tomographic programs produce exposures of any part of the maxillo-facial region. The tomographic exposures can be cross-sectional, longitudinal or mixed.

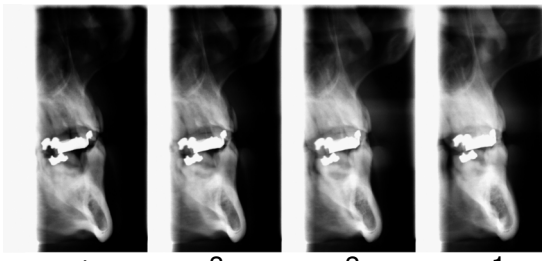
In each program the user can select target area, patient size and movement between the layers. The layer thickness is adjustable in transtomography mode. You can select a layer thickness of 1, 3, 6, 9, 18 or 36mm.

Cross-sectional tomographic exposure programs	
4x CRS Manual Manual, 1-4 cross-sectional images. The operator can make manual adjustments between the exposures.	

4x CRS Autoposition

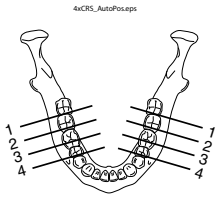
Automatic, 4 cross-sectional images.

The exposure position is automatically moved between exposures. The movement (distance from middle to middle) is adjustable, and it can be either 1, 3, 6, 9 or 12mm.



4. 3. 2. 1.

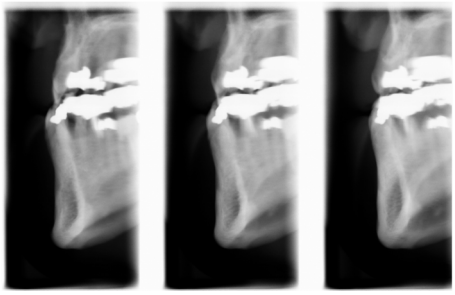
NOTE The selected target position is image no. 2.



3x CRS Automatic Angulation

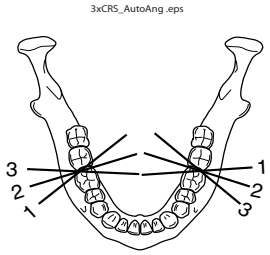
Automatic, 3 cross-sectional images with different angles. Images can be used as stereopairs.

The C-arm angle is automatically changed between exposures. The angle of the first exposure is the selected angle +7° counterclockwise, and the angle of the third exposure is the selected angle +7° clockwise.



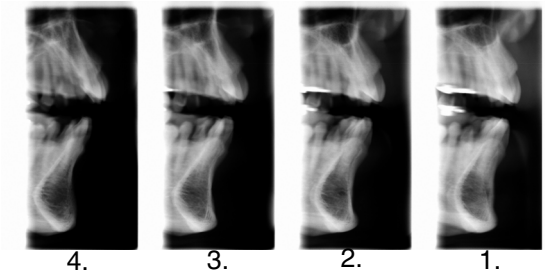
3. 2. 1.

NOTE The selected target position is image no. 2.



4x CRS Anatomic

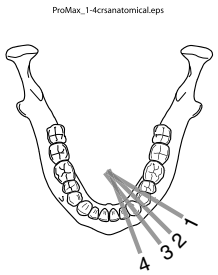
Automatic, 4 cross-sectional images following the anatomy of the exposed area. Note that you have to set the image area parameters so that all four images will fit in the selected jaw side.
Distance (middle to middle) between the target points is adjustable.



4. 3. 2. 1.

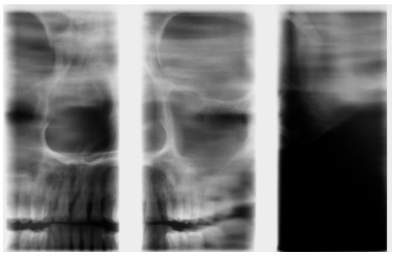
NOTE In this program, the selected target position is image no. 1.

NOTE The program stops if the selected position moves over the midsagittal plane.

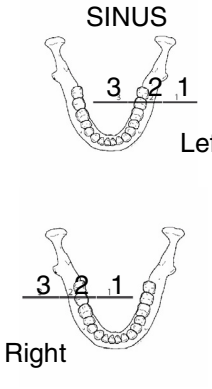


3x PA Sinus & Nasal

Automatic, 3 posteroanterior images from sinus area/midsagittal plane (nasal cavity).



3. 2. 1. Left



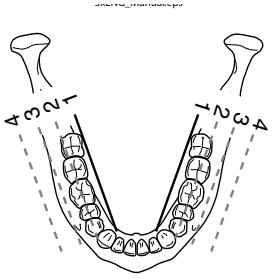
NOTE In this program, the selected target position is image no. 2.

Longitudinal tomographic exposure programs

4x LNG Manual

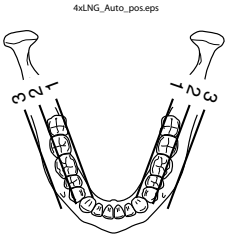
Manual, 1-4 longitudinal images.

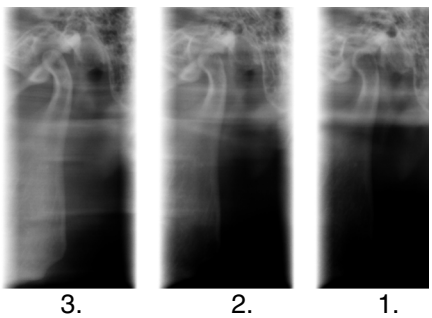
Distance (middle to middle) between the target points is adjustable.



3x LNG Autoposition

Automatic, 3 longitudinal images. The exposure position is automatically moved between exposures. The movement is adjustable, and it can be either 1, 3, 6, 9 or 12mm. Distance (middle to middle) between the target points is adjustable.





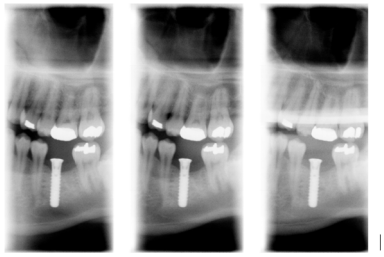
3. 2. 1.

NOTE The selected target position is image no. 2.

3x LNG Automatic Angulation

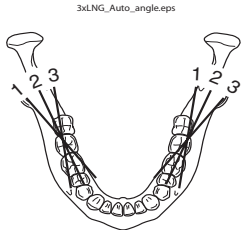
Automatic, 3 longitudinal images with different angles. Images can be used as stereopairs.

The C-arm angle is automatically changed between the exposures. The angle of the first exposure is the selected angle +7° counterclockwise, and the angle of the third exposure is the selected angle +7° clockwise.



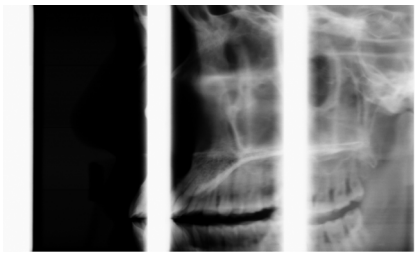
3. 2. 1.

NOTE The selected target position is image no. 2.



3x Lateral Sinus & Nasal

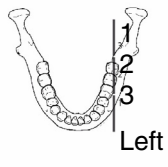
Automatic, 3 longitudinal images from sinus area and nasal cavity.

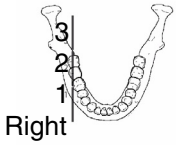


3. 2. 1.

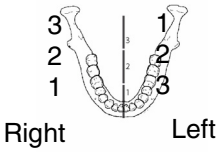
NOTE In this program, the selected target position is image no. 2.

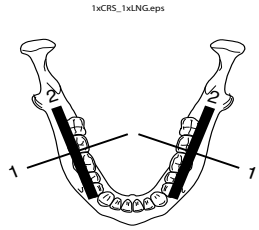
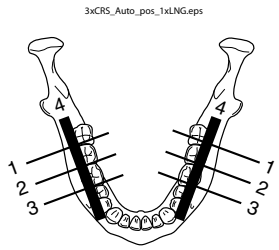
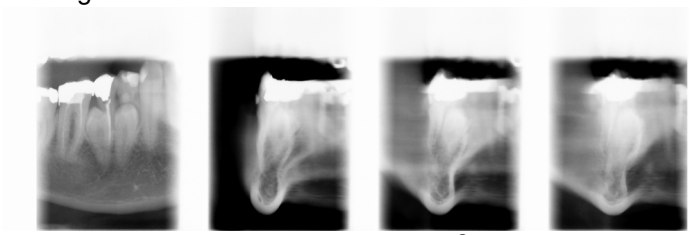
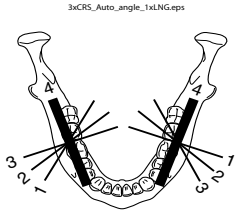
SINUS





NASAL

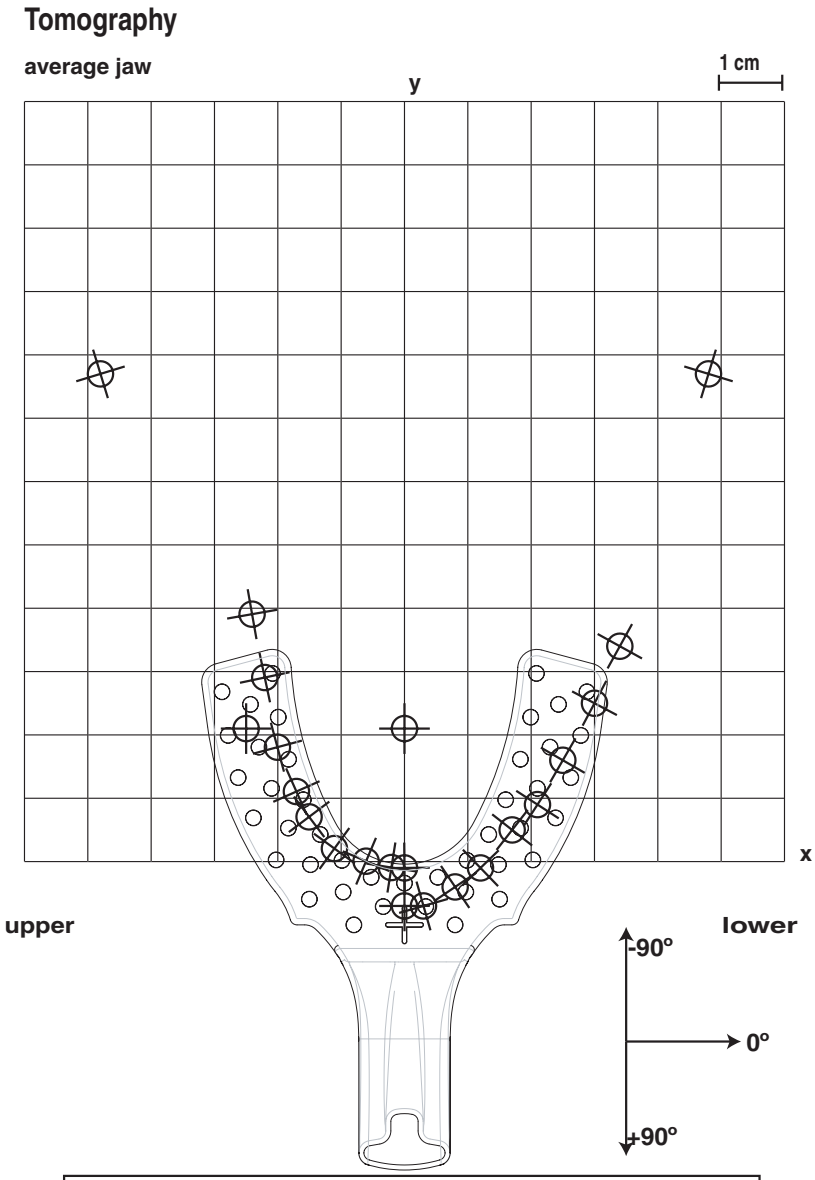


Mixed tomographic exposure programs	
1x CRS, 1x LNG Automatic, cross-sectional and a 9mm (min.) longitudinal image. 2. 1.	
3x CRS Autoposition, 1x LNG 3 cross-sectional images and a 9mm (min.) longitudinal image. The exposure position is automatically moved between the cross-sectional exposures. The movement is adjustable, and it can be either 1, 3, 6, 9 or 12mm. 4. 3. 2. 1. ***NOTE The selected target position is image no. 2.***	
3x CRS Automatic Angulation, 1x LNG, Automatic Angulation 3 cross-sectional images with different angles and a 9mm (min.) longitudinal image. The C-arm angle is automatically changed between the exposures. The angle of the first exposure is the selected angle +7° counterclockwise, and the angle of the third exposure is the selected angle +7° clockwise.  4. 3. 2. 1. ***NOTE The selected target position is image no. 2.***	

Program		Real size (W x H) mm	Size on receptor (W x H) mm	Magnification	Layer thickness mm
Tomography	full	40 x 87	60 x 130	1.5 x	1, 3, 6, 9, 18, 36
	standard	40 x 47	60 x 70		

5.4.2 Jaw shape and size in tomography exposure

Average jaw



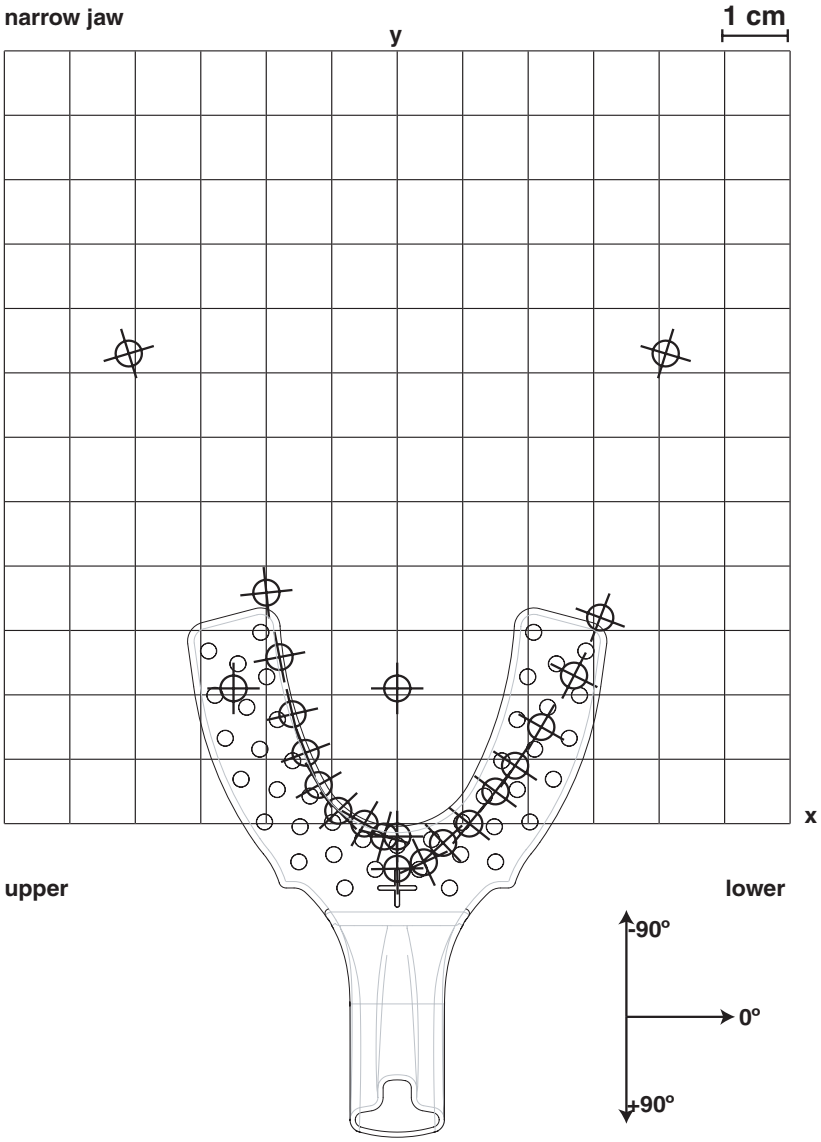
Coordinates of the target sites							
target (tooth)	upper			lower			
	x	y	angle	x	y	angle
Between incisors 0	0	-1	90	0	-7	90
1	-2	-1	81	3	-7	74
2	-6	0	67	8	-4	56
3	-11	2	54	12	-1	46
4	-15	7	37	17	5	38
5	-17	11	24	21	9	33
6	-20	18	15	25	16	30
7	-22	29	12	30	25	28
8	-24	39	10	34	34	28
Condyle 9	-48	77	17	48	77	17
Nasal area 10	0	21	0			
Sinus 11	-25	21	0			

Upper:
Right-hand side coordinates - X-coordinate is positive on the left-hand side.

Lower:
Left-hand side coordinates - X-coordinate is negative on the right-hand side.

Narrow jaw

Tomography



Coordinates of the target sites

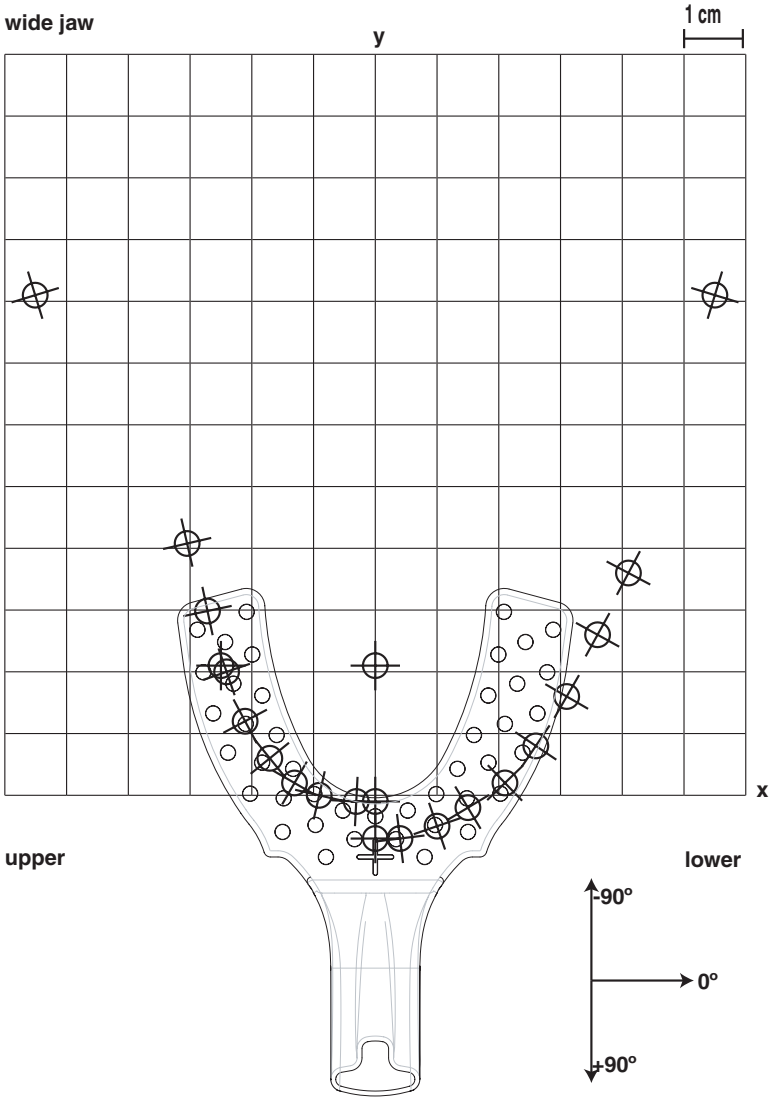
target (tooth)	upper x	upper y	upper angle	lower x	lower y	lower angle
Between incisors 0	0	-2	90	0	-7	90
1	-2	-2	75	3	-6	65
2	-5	0	60	7	-3	47
3	-9	2	44	11	0	39
4	-12	6	30	15	5	37
5	-14	11	21	18	9	34
6	-16	17	13	22	15	30
7	-18	26	11	27	23	27
8	-20	36	6	31	32	21
Condyle 9	-41	73	17	41	73	17
Nasal area 10	0	21	0			
Sinus 11	-25	21	0			

Upper:
Right-hand side coordinates - X-coordinate is positive on the left-hand side.

Lower:
Left-hand side coordinates - X-coordinate is negative on the right-hand side.

Wide jaw

Tomography



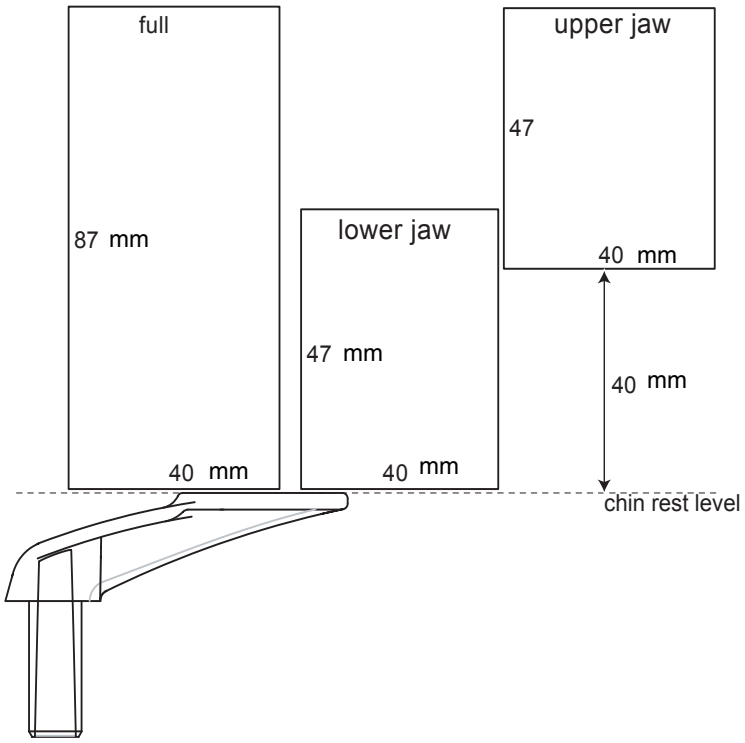
	Coordinates of the target sites						
	target	upper			lower		
	(tooth)	x	y	angle	x	y	angle
Between incisors	0	0	-1	90	0	-7	90
	1	-3	-1	87	4	-7	83
	2	-9	0	77	10	-5	71
	3	-13	2	60	15	-2	59
	4	-17	6	39	21	2	46
	5	-21	12	28	26	8	34
	6	-24	20	21	31	16	30
	7	-27	31	13	36	26	29
	8	-30	41	13	41	36	27
Condyle	9	-55	81	17	55	81	17
Nasal area	10	0	21	0			
Sinus	11	-25	21	0			

Upper:
Right-hand side coordinates - X-coordinate is positive on the left-hand side.

Lower:
Left-hand side coordinates - X-coordinate is negative on the right-hand side.

Jaw size

Size and position of the tomographic image window



	real size		size on film		x 1.5
	width	height	width	height	
full	40 mm	87 mm	60 mm	130 mm	
std	40 mm	47 mm	60 mm	70 mm	

6 PREPARATIONS FOR THE EXPOSURE

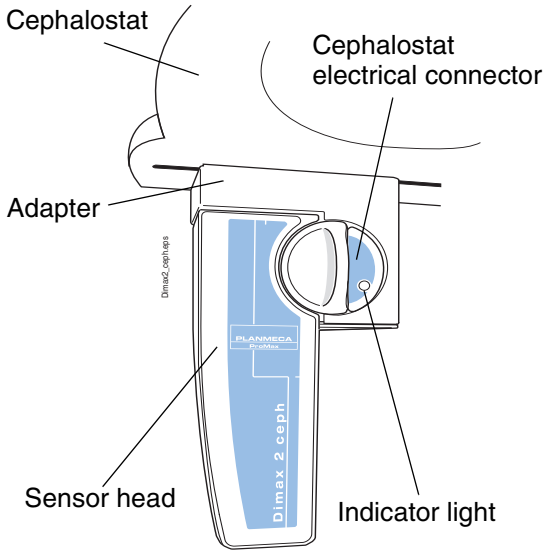
6.1 Moving the sensor head from cephalostat to C-arm

If the X-ray unit is equipped with a cephalostat (optional) the unit can have a movable sensor head that can be attached either to the adapter on the cephalostat or C-arm. Alternatively, the unit can have two fixed sensor heads.

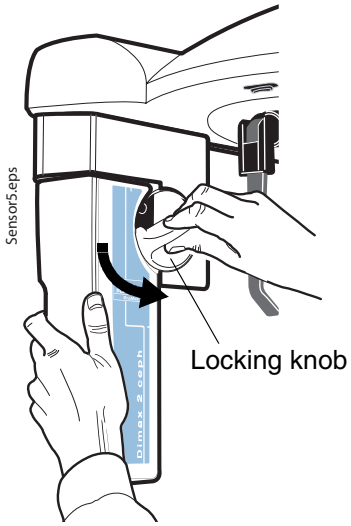
If your unit has a movable sensor head, follow these instructions when you move the sensor head from the cephalostat to the C-arm.

Detaching the sensor head from the cephalostat

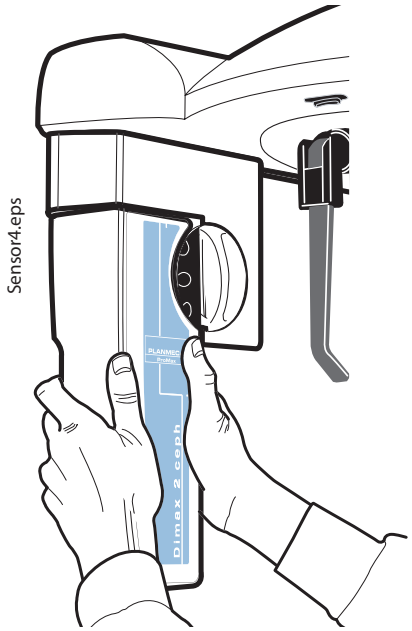
NOTE ***The indicator light is lit when the Dimax3 sensor is in use. Removing the sensor head when the indicator light is lit might harm the sensor or cause image data loss.***



Push in the cephalostat electrical connector. This will disconnect the electrical connection between the sensor head and cephalostat.

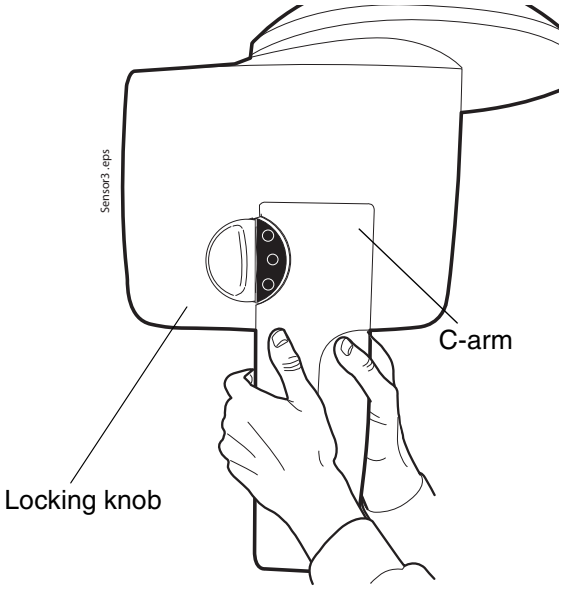


Turn the locking knob 180 degrees. This will release the sensor head locking mechanism.

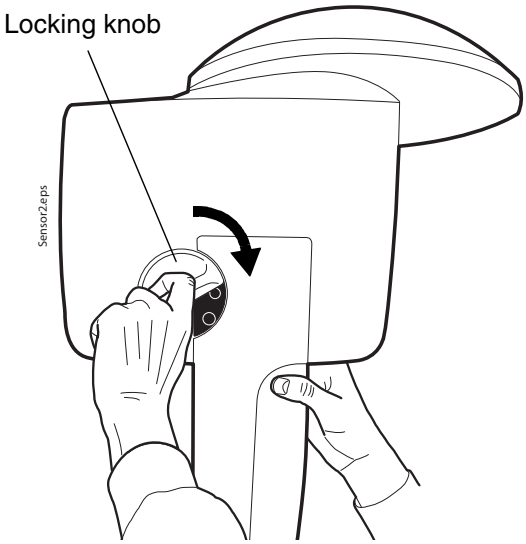


Now pull the sensor head out carefully.

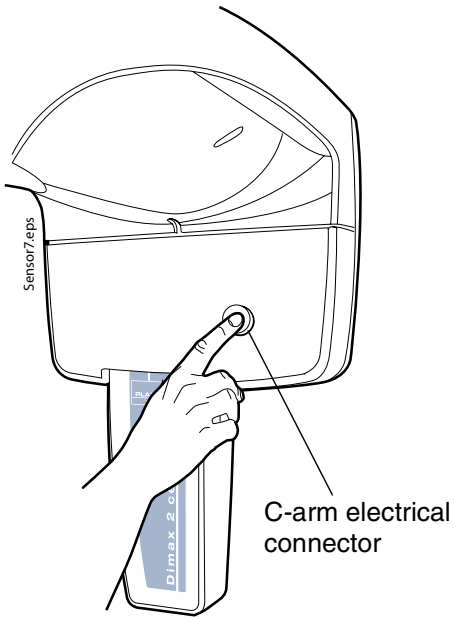
Attaching the sensor head to the C-arm



Push the sensor head onto the adapter on the C-arm.



Turn the locking knob 180 degrees in order to complete the mechanical connection.



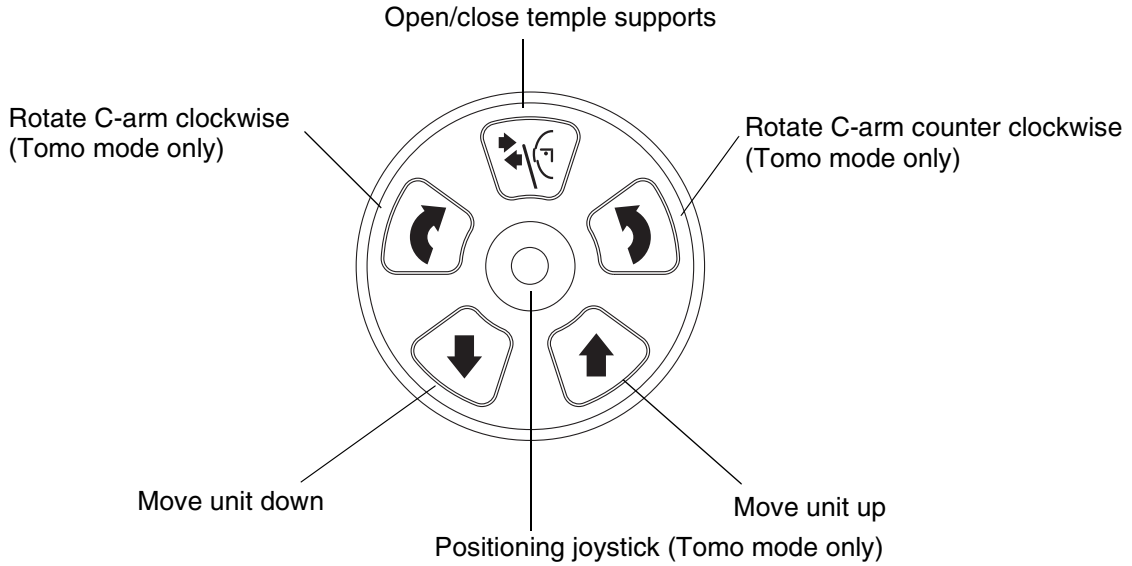
On the inside of the C-arm, push in the C-arm electrical connector. This will make the electrical connection between the sensor head and C-arm.

6.2 Preparing the patient

Ask the patient to remove any spectacles, hearing aids, dentures, and personal jewellery such as earrings, necklaces, and hairpins.

Place a protective lead apron over the patient's back if required.

7 PATIENT POSITIONING CONTROLS



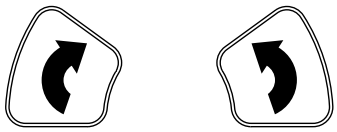
The patient positioning controls are located above the control panel.

NOTE ***Never allow patients to press the positioning controls when they are positioned in the unit.***

Temple support button

Press the temple support button to open the temple supports. The temple supports can be closed by pressing the temple support button again.

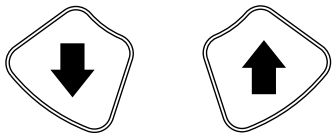
C-arm rotation buttons



The angle of the C-arm is adjusted by pressing the C-arm rotation buttons. Pressing the button on the left will rotate the C-arm clockwise, and pressing the button on the right will rotate the C-arm counterclockwise. The movement will stop when the button is released.

NOTE ***The C-arm rotation buttons can only be used when taking linear tomographic (Tomo) exposures. See section 13 "TOMOGRAPHIC EXPOSURE" on page 91 for more information on how to use the C-arm rotation buttons.***

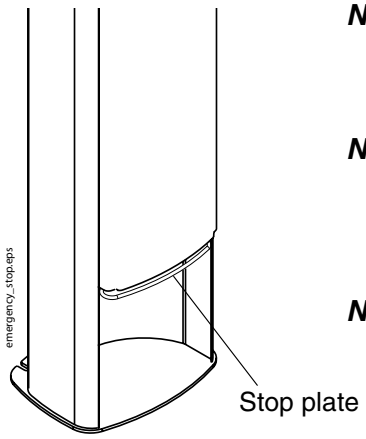
Height adjusting buttons



Press either of the height adjusting buttons to move the telescopic column up or down so that the unit can be adjusted to suit the height of the patient. Pressing the button on the left will move the unit down, and pressing the button on the right will move the unit up. The movement will stop when the button is released.

The telescopic column moves slowly at first, then faster.

NOTE ***If for some reason either of the height adjusting buttons gets stuck during operation, you can stop the up/down movement by pressing any of the other control buttons or the positioning joystick. This is a safety measure that guarantees that the up/down movement can be stopped in an emergency.***



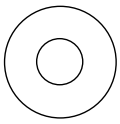
NOTE ***Be careful that the unit does not hit the ceiling when you move the column up. The maximum height can be programmed, contact your Planmeca dealer for further information.***

NOTE ***Make sure that there is no object under the telescopic column when you move the unit down. If something is in danger of becoming trapped, release the button immediately to stop the movement.***

NOTE ***The column movement stops automatically if the emergency stop plate at the bottom is pressed upwards. Clear any obstruction before moving the column again.***

NOTE ***When positioning wheelchair patients, move first the telescopic column down before positioning the patient to the unit.***

Positioning joystick



The positioning joystick is used to adjust the position of the target area in tomographic exposures. The joystick can be moved crosswise or lengthwise.

NOTE ***The positioning joystick can only be used when taking linear tomographic (Tomo) exposures. See section 13 "TOMOGRAPHIC EXPOSURE" on page 91 for more information on how to use the positioning joystick.***

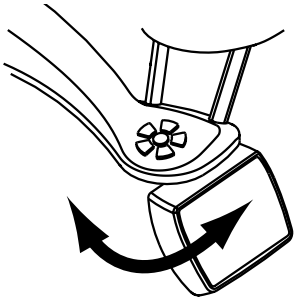
8 CONTROL PANEL

To make a selection on the control panel, simply touch the screen with your finger on a text field or on an icon. For example, to select the program type touch the *Prog.* field with your finger. You will hear a signal tone when a field or an icon is activated.

To cancel a selection, touch the *Cancel* field.

Only the text fields and icons on the screen are touch-sensitive, and touching areas outside them will not activate an action.

Screen saver mode will be switched on when the control panel has been untouched for 30 minutes. When in screen saver mode, the Ready/Pret light on the right-hand side of the screen and the indicator light on the exposure switch will come on. Touching the screen will activate the control panel again.



NOTE ***The position of the control panel can be changed by moving the control panel to the right or left.***

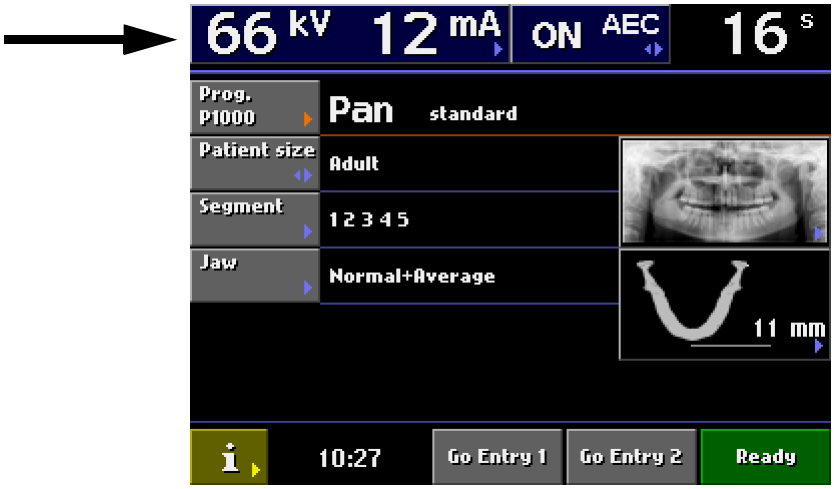
NOTE ***The contents of the control panel displays depend on the unit configuration. The displays shown here are from a SCARA3 unit featuring all currently available imaging programs. SCARA3 units have three joints.***

NOTE ***Refer to the Cephalostat user's manual for information on how to select the cephalometric exposure program.***

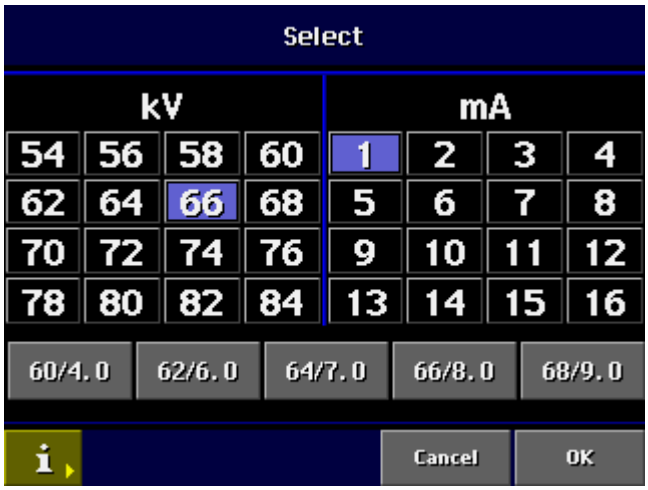
8.1 General settings

8.1.1 Selecting kilovolt and milliampere values

Touch the kV/mA field on the main display.



The following display appears.



Select the correct kV and mA values for the patient being X-rayed according to the build of the patient. Alternatively you can select one of the quick buttons on the bottom of the *Select kV/mA* display.

The exposure values for the exposure programs are given in their corresponding chapters.

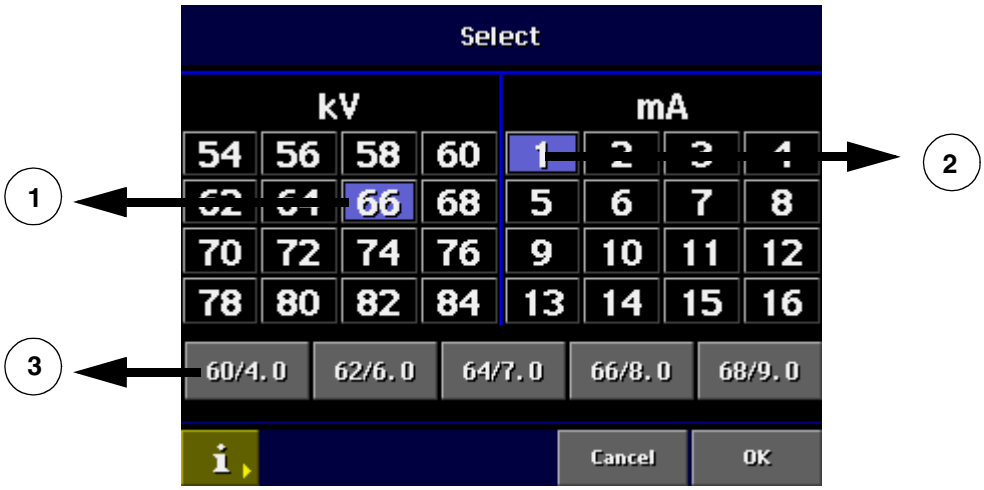
Confirm the selection and return to the main display by touching *OK*.

8.1.2 Programming quick button values

You can use the quick buttons on the bottom of the *Select kV/mA* display. The quick button values have been preset at the factory but you can reprogram the values.

Select first the kV (1) and mA (2) values by touching the corresponding fields and touch the desired quick button (3) until you hear a signal tone. By doing this the kV and mA values will be changed for the quick button.

Confirm the selection and return to the main display by touching *OK*.



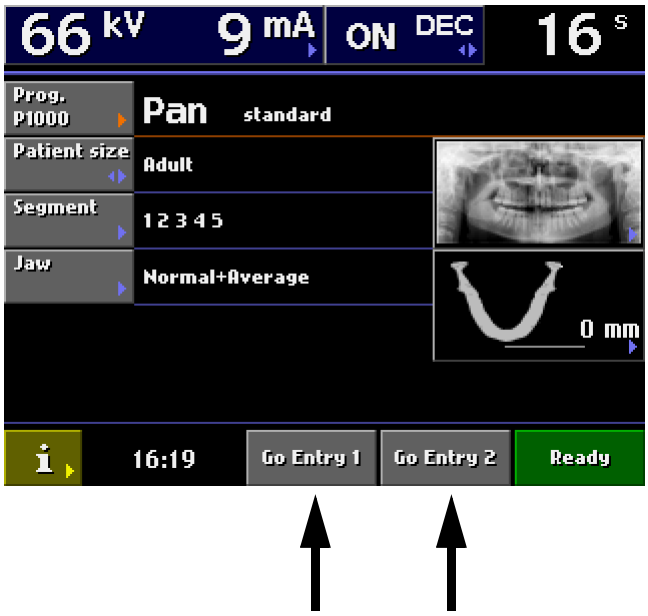
8.1.3 Selecting patient entry position

ProMax utilizes the new SCARA (Selectively Compliant Articulated Robot Arm) technology for arm movements. The SCARA3 robot arm unit with three joints offers two patient entry positions: *Entry 1* and *Entry 2*. You can use either of them according to your individual needs and preferences.

Selecting *Go Entry 1* will move the C-arm to the back, away from the patient positioning area. This full view position allows you to monitor and adjust the patient's position freely from all directions.

Go Entry 1 function can also be disabled for example in cases where there is no space for the C-arm to move. See section "Behavioural preferences" on page 54.

Selecting *Go Entry 2* will position the C-arm around the temple supports. This is the traditional closed patient entry position.



8.1.4 Selecting patient size

To change the patient size from adult to child, touch the *Patient size* field on the main display. To change the setting back to adult, touch the *Patient size* field again.

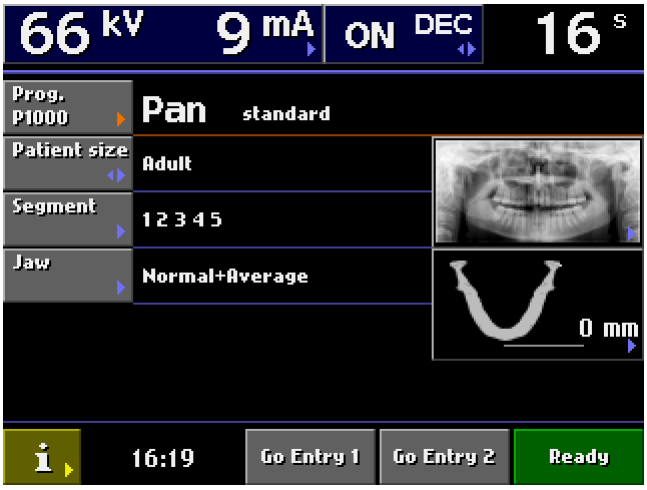
If the patient is a child or a very small adult select the child setting, otherwise select *Adult*. When you select the child setting the width and height of the exposed area will be slightly reduced.

NOTE ***Selecting "Child" automatically changes the setting of the jaw size to "Narrow".***

NOTE ***Panoramic exposure program: If the unit is equipped with a fixed primary collimator, only width will be changed.***

8.2 Selecting panoramic exposure program

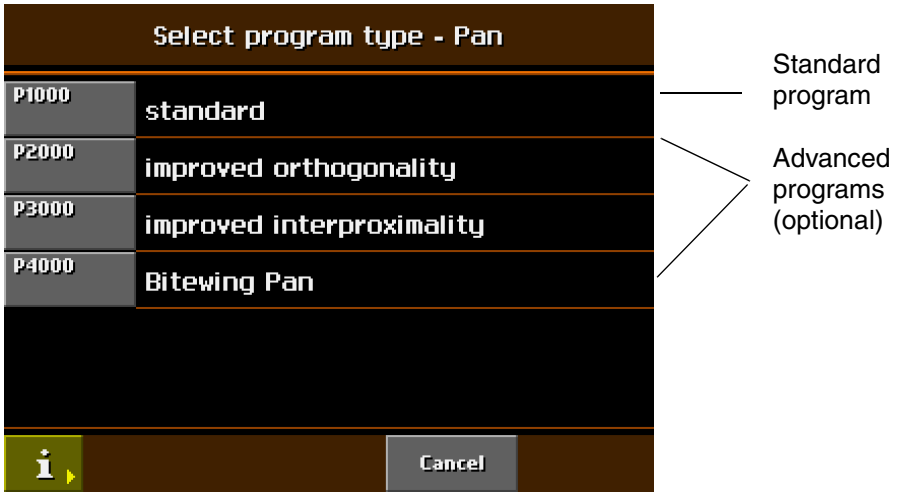
To select the desired panoramic exposure program touch the *Prog.* field on the main display. The main display is the display that is shown when the unit is switched on.



The *Select program type* display shown below appears. Select program type *Pan*.

NOTE ***The "Select program type" display will show all the exposure programs that the unit features at the moment. The unit can be upgraded with new exposure programs, contact your dealer for further information.***

The *Select program type - Pan* display shown below appears. Select the desired panoramic exposure program by touching the appropriate field on the screen.



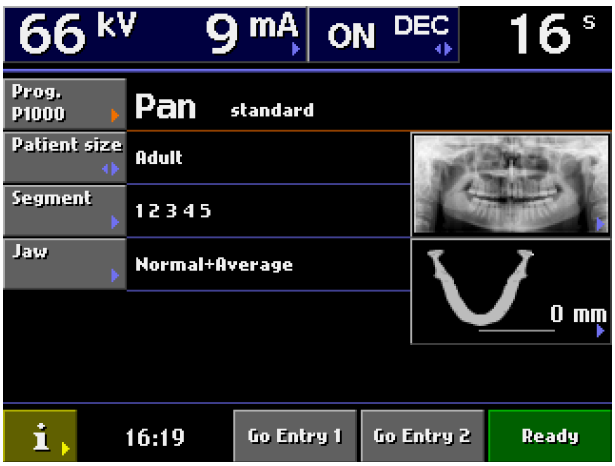
NOTE ***The exposure program "Standard" is included in the standard program package. All other panoramic programs are optional.***

When you have selected the required panoramic exposure program the main display will be shown again.

8.2.1 Selecting segmentation (optional)

This optional function allows you to take exposures of different jaw segments. This will reduce the radiation dosage as only diagnostically interesting areas need to be X-rayed.

Touch the *Segment* field on the main display, or alternatively, touch the segment icon on the right side of the display.



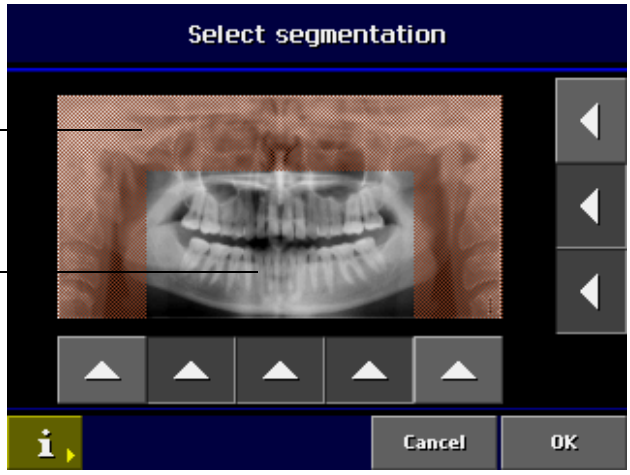
OR SEGMENT ICON

The *Select segmentation* display appears. The display shows an icon which is divided into three horizontal sectors and/or five vertical sectors depending on the unit configuration. The segment numbers in the display (1 2 3 4 5) refer to the five vertical sectors.

Touch the corresponding arrow field(s) to **deselect** the sector(s) that should not be exposed. The sectors which will **not** be exposed will turn dark. The sectors which will be exposed remain white.

NOTE ***It is not possible to expose two separate horizontal sectors. Deselecting only the middle horizontal sector will automatically turn the upper horizontal sector dark as well.***

Touching the arrow or the field of a deselected sector again will change the sector's colour back to white.



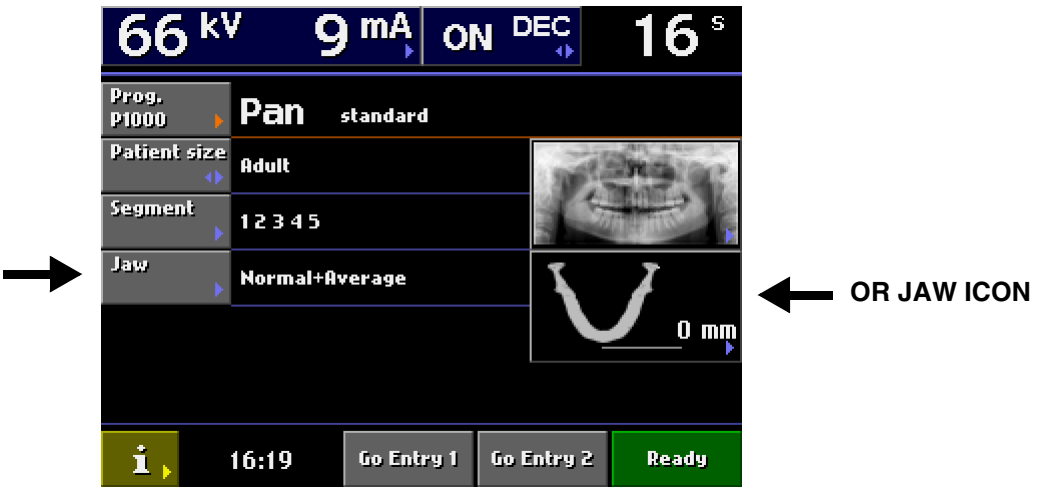
Confirm the selection by touching *OK*.

NOTE ***Segmentation is a mechanical procedure and the marked area shown in the display is approximate. Therefore, the dimension of the exposed area depends on the patient's anatomy.***

8.2.2 Selecting jaw shape & size

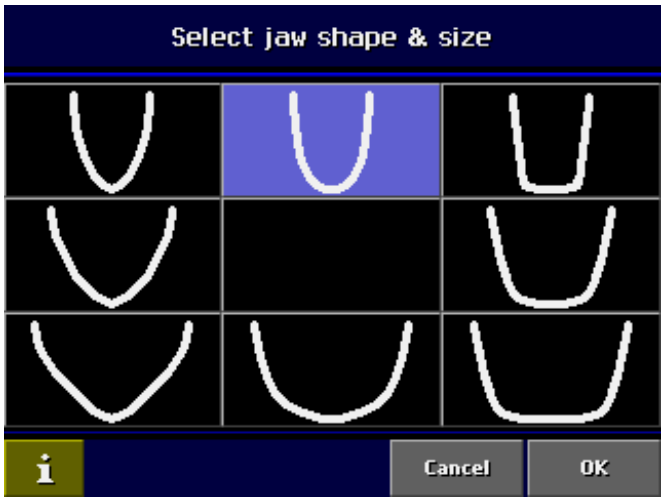
This function allows you to adjust the form of the focal trough to accommodate patients with different jaw shapes and sizes.

Touch the *Jaw* field on the main display, or alternatively, tap the jaw icon on the right side of the display.



The *Select jaw shape & size* display appears. The marking on the jaw icon demonstrates the image layer position.

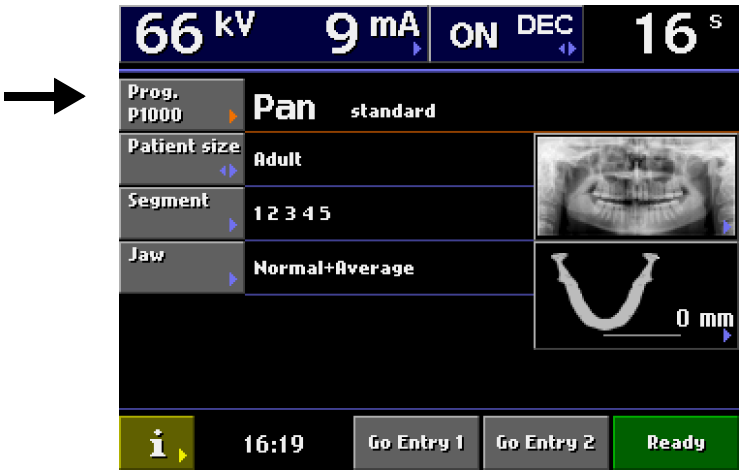
Select the correct jaw shape and size for the patient to be X-rayed by tapping on the corresponding icon.



Confirm the selection and return to the main display by touching *OK*.

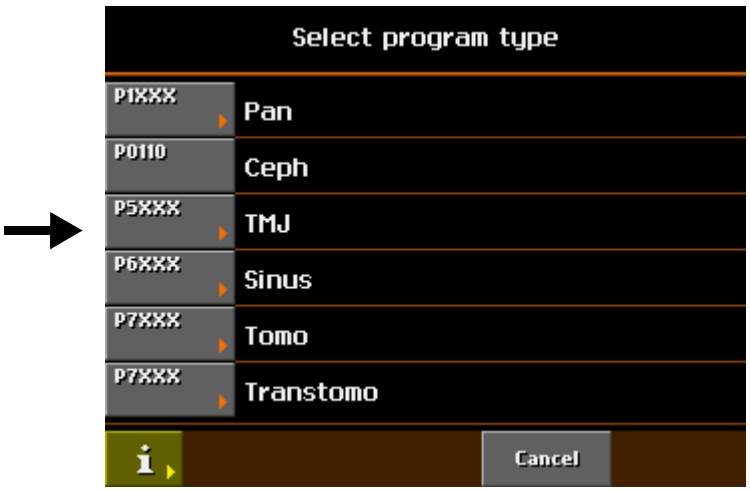
8.3 Selecting temporomandibular joint (TMJ) exposure program

To select the desired temporomandibular joint (TMJ) exposure program, touch first the *Prog.* field on the main display.

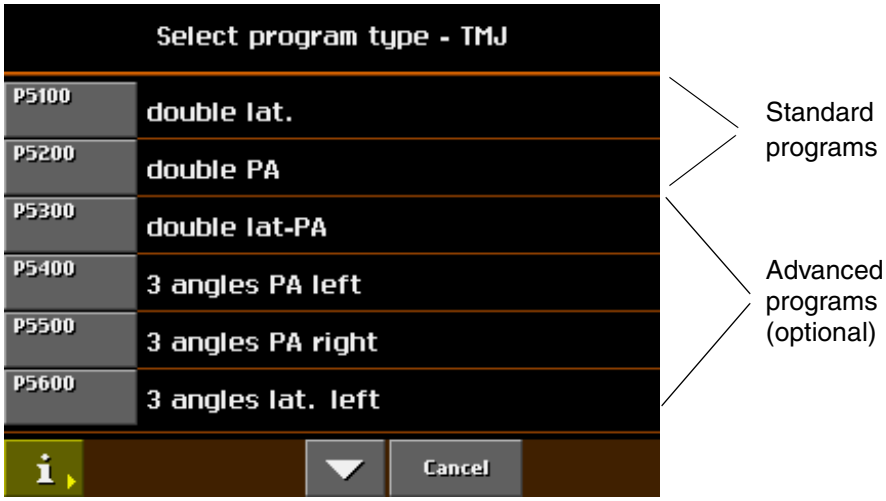


The *Select program type* display shown below appears. Select program type *TMJ*.

NOTE ***The "Select program type" display will show all the exposure programs that the unit features at the moment. The unit can be upgraded with new exposure programs, contact your dealer for further information.***



The *Select program type - TMJ* display shown below appears. Select the desired TMJ exposure program by touching the appropriate field on the screen. If the TMJ program you wish to select is not shown in the display, you can use the up and down arrows to scroll through the list.



There are seven temporomandibular joint exposure programs: three double TMJ and four multi-angle TMJ programs.

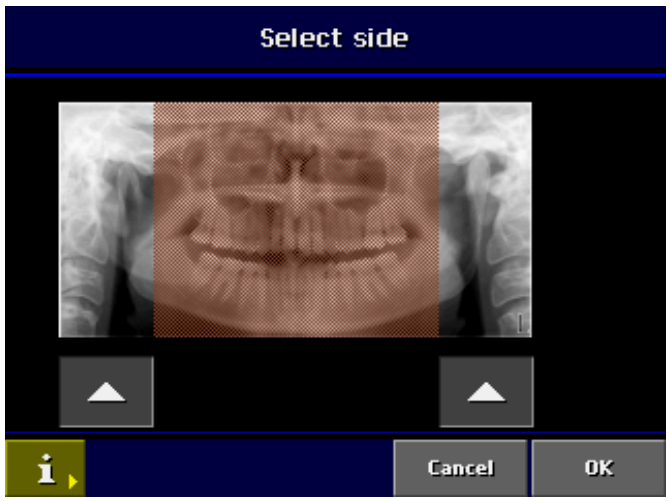
NOTE ***The exposure programs "Double lat." and "Double PA" are included in the standard program package. All other TMJ programs are optional.***

When you have selected the required temporomandibular joint exposure program the main display will be shown again.

8.3.1 Selecting jaw size

By tapping the segment icon the following display appears. *Select side* enables you to select the X-rayed condyle. You can select either one or both condyles.

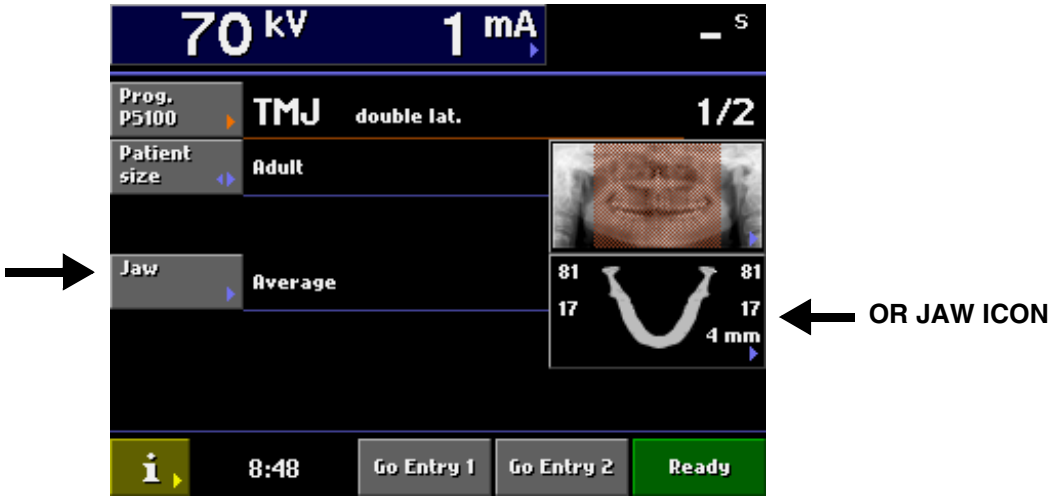
NOTE ***This function does not exist in SCARA2 units.***



8.3.2 Adjusting position and imaging angle

This function allows you to adjust the form of the focal trough to accommodate patients with different jaw sizes.

Touch the *Jaw* field on the main display, or alternatively, tap the jaw icon on the right side of the display.



The *Select jaw size, adjust position and angle* display appears. The marking on the jaw icon demonstrates the image layer position.

The jaw size can be changed by touching the *Jaw* field or the jaw icon. The size of the jaw affects the position of the image.

Select the correct position and angle for the patient to be X-rayed by tapping on the corresponding arrows.

You can also select an asymmetric exposure in case you take Condyle exposures where the positions/angles of the jaw are different. This feature enables you to adjust the angle and position of the jaw separately on both sides.

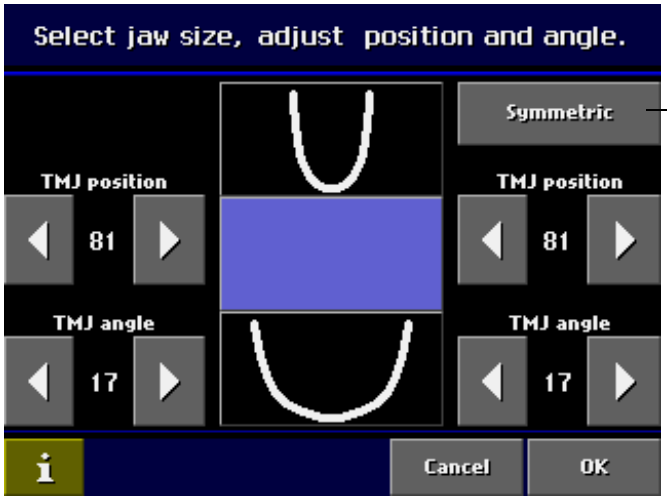
The default angle is 17°.

Jaw size:

Narrow

Average

Wide



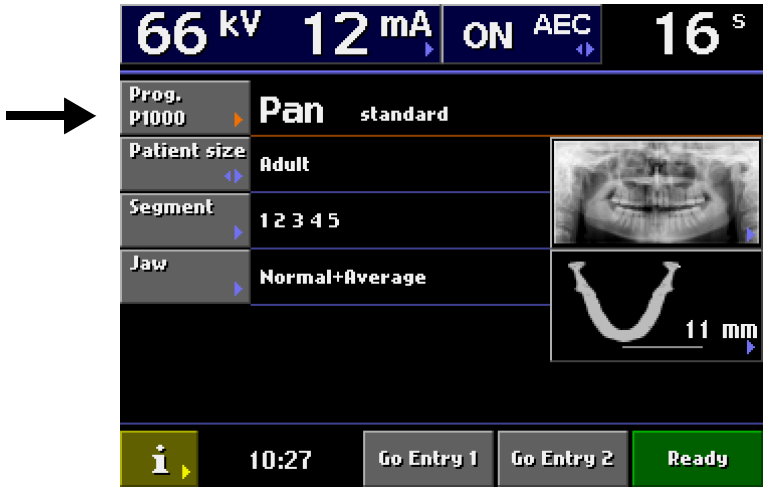
Jaw shape:

Normal

Confirm the selection and return to the main display by touching *OK*.

8.4 Selecting sinus exposure program

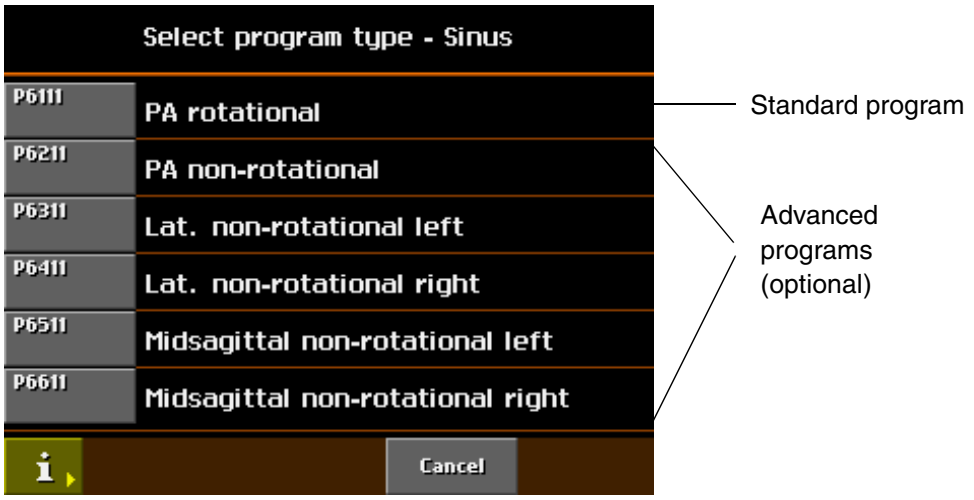
To select the desired sinus exposure program, touch first the *Prog.* field on the main display.



The *Select program type* display shown below appears. Select program type *Sinus*.

NOTE ***The "Select program type" display will show all the exposure programs that the unit features at the moment. The unit can be upgraded with new exposure programs, contact your dealer for further information.***

The *Select program type - Sinus* display shown below appears. Select the desired sinus exposure program by touching the appropriate field on the screen.



NOTE ***The exposure program "PA rotational" is included in the standard program package. All other sinus programs are optional.***

When you have selected the required sinus exposure program the main display will be shown again.

8.5 Selecting tomographic (Tomo) exposure program

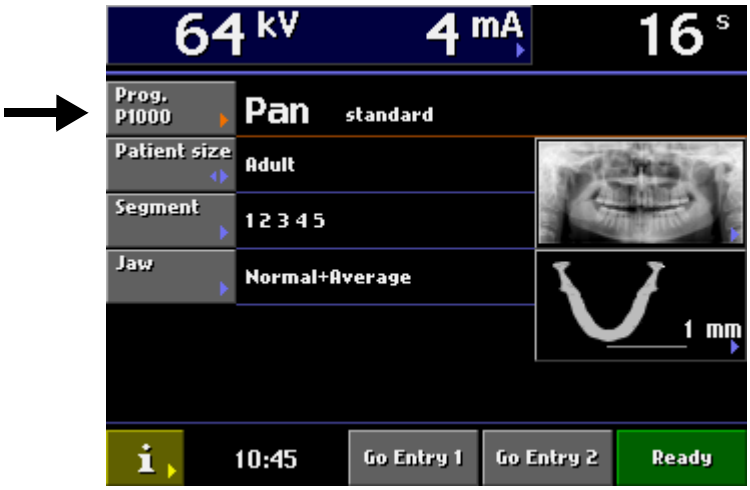
In tomographic (Tomo) exposure programs tomographic images from maxilla, mandible or temporo-mandibular joints are taken. These images can be cross-sectional or longitudinal, and their angle can be adjusted.

There are two tomography methods available: digital tomography and digital transtomography.

Digital tomography uses one sweep method. The narrow X-ray beam makes one sweeping movement and the rotation centre moves simultaneously along the image layer. The layer thickness is always 6mm.

Transtomography uses multiple sweep method. During the transitional movement along the image layer the X-ray beam makes also pendular movement back and forth. The layer thickness can be adjusted.

To select the desired tomographic (Tomo) exposure program, touch first the *Prog.* field on the main display.



The *Select program type* display shown below appears. Select *Tomo* or *Transtomo* by touching the corresponding fields.

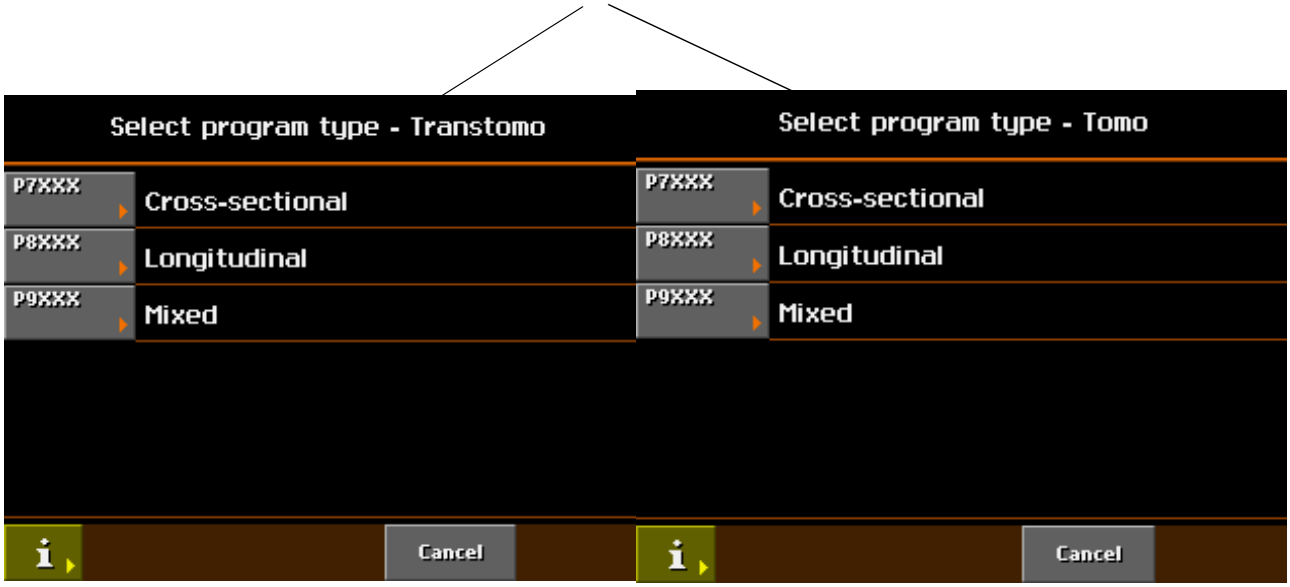
NOTE ***The "Select program type" display will show all the exposure programs the unit features at the moment. The unit can be upgraded with new exposure programs, contact your dealer for further information.***

The *Select program type - Transtomo/Tomo* display shown below appears.

There are 14 Tomo/Transtomo exposure programs: 6 cross-sectional, 5 longitudinal and 3 mixed programs. Select the desired exposure program type by touching the appropriate field on the screen.

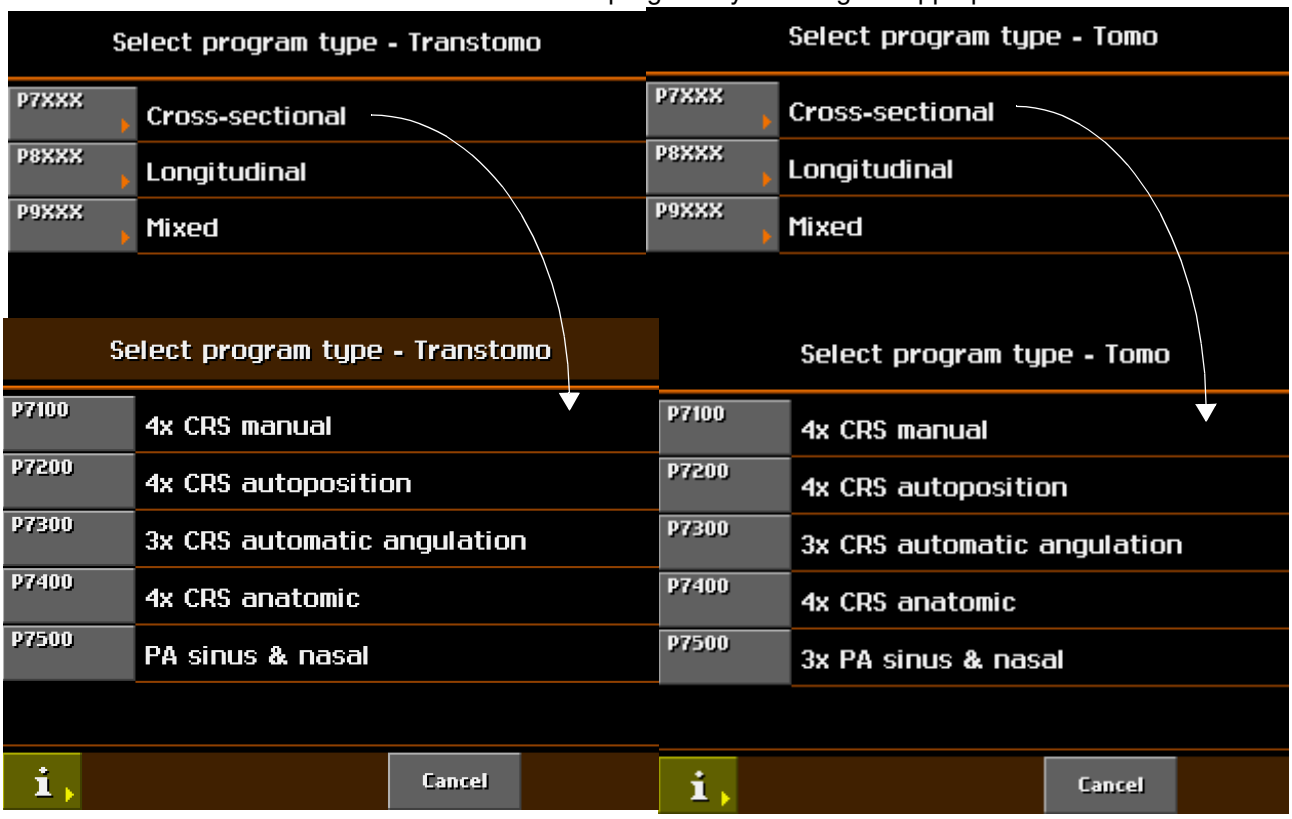
NOTE ***The standard program package does not contain any of these programs. All Tomo exposure programs are optional.***

Optional programs



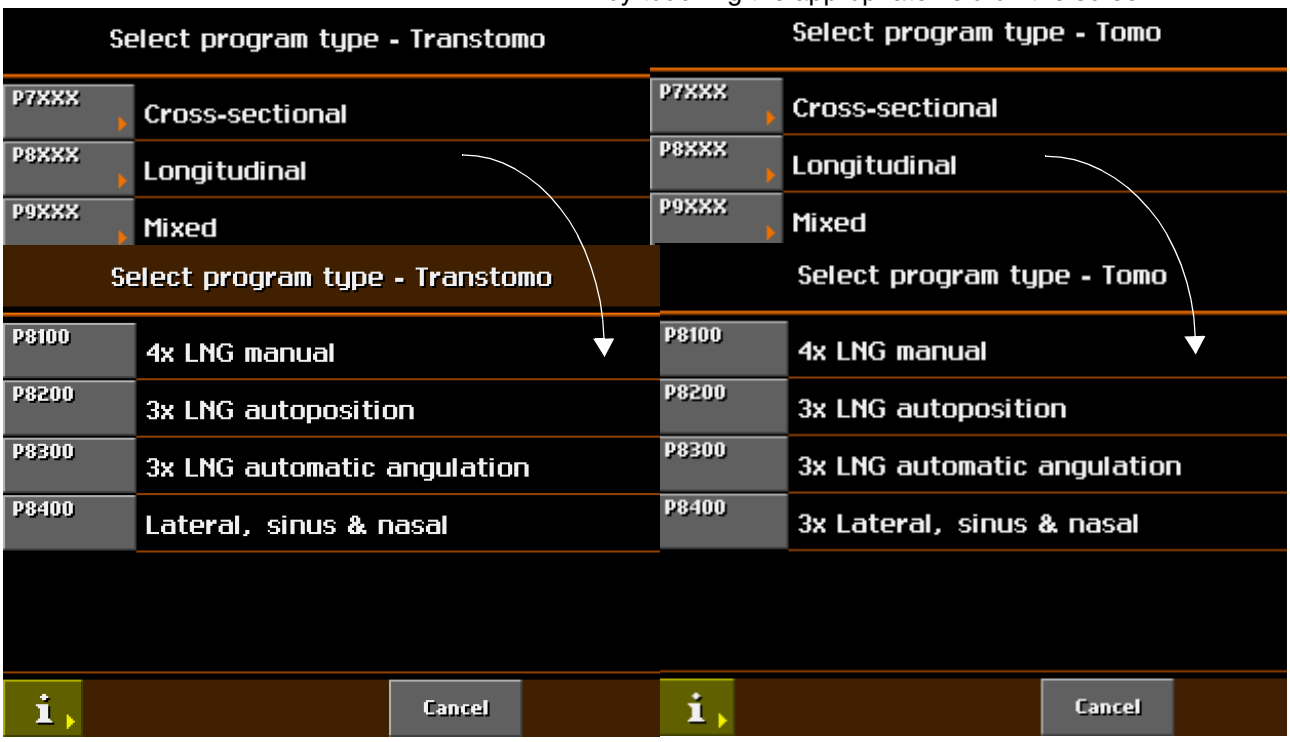
If you select *Cross-sectional*, the following display appears.

Select the desired cross-sectional Tomo exposure program by touching the appropriate field on the screen.



If you select *Longitudinal*, the display shown below appears.

Select the desired longitudinal Tomo exposure program by touching the appropriate field on the screen.



If you select *Mixed*, the display shown below appears. Select the desired mixed Tomo exposure program by touching the appropriate field on the screen.

8.5.1 Selecting target area

When you have selected the required tomographic exposure program the *Select target area* display will be shown.

On the *Select target area* display, specify the image area by selecting the upper or lower jaw, right or left side, jaw size, distance between exposures, standard or full size exposure, and the tooth number (or TMJ). The selected target position will be marked on the icon.

Image layer can **only** be adjusted in Transtomo program.

NOTE ***The position of the target area is based on average jaw measurements. The position must be adjusted after the patient has been positioned to the unit, see section 13.2 “Adjusting the position of the target area” on page 96.***

Jaw

Select the lower or upper jaw by touching the *Jaw* field.

Side

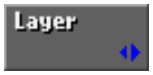
Select the right or left side of the jaw by touching the *Side* field.

NOTE ***The side selection can also be made by simply touching the jaw icon on that side.***

Jaw size

Select the jaw width by touching the *Jaw size* field. The *Select jaw shape & size* display will appear. Select the correct jaw size (narrow, average or wide) for the patient to be X-rayed by tapping on the corresponding icon. Touch *OK* to confirm the selection.

Layer



In digital tomography the layer is always 6 mm and the *Layer* field is **not displayed** on the control panel.

In digital transtomography the image layer can be selected between 1, 3, 6, 9, 18 and 36 mm.

Distance

Select the distance between the exposures by touching the *Distance* field. The distance can be 1, 3, 6, 9 or 12mm, and the list is cyclical.

Size

Select a standard (either lower or upper collimation) or full size (full collimation) exposure by touching the *Size* field. If you select *Standard* only the selected jaw will be exposed, and selecting *Full* will produce a full size exposure of both jaws.

Target

Select the tooth number (0-8) or temporomandibular joint (9) by touching the *Target* field. The number 0 indicates the space between the central incisors. The list is cyclical.

NOTE ***The target selection can also be made by simply touching the jaw icon on the corresponding location.***

NOTE ***The selected target position is image no. 1. In automatic programs the selected target position is image no. 2. Refer to the program lists on previous pages.***

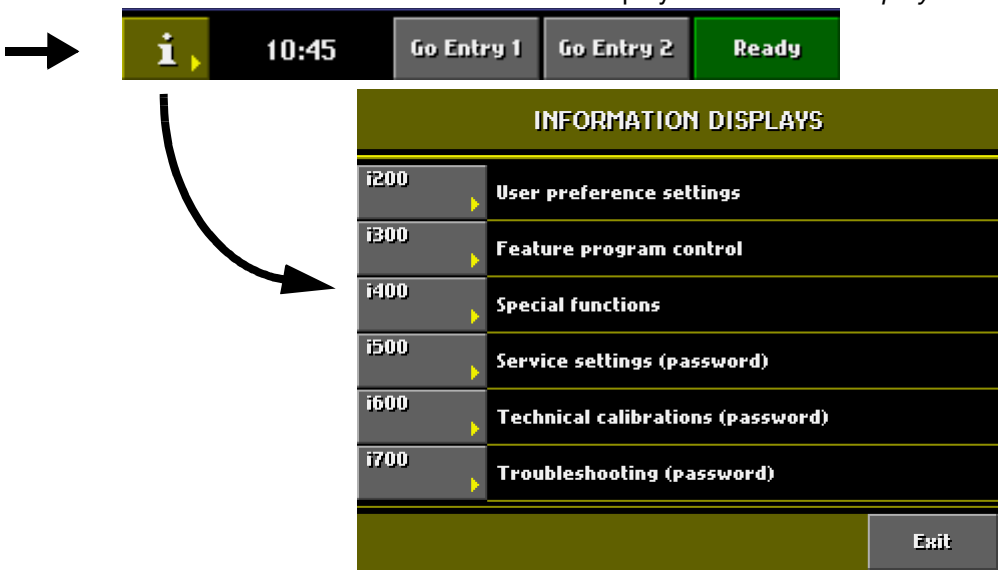
When you have set the target position, confirm the selections by touching the *OK* field. The main display appears.

8.6 Information displays

The control panel has a number of additional functions for special requirements. Some of the special functions (*User preference settings, Feature program control* and *Special functions)* can be entered by the user, and others (e.g. *Service settings* and *Technical calibration*) are for the use of service personnel only. This section describes the user specific special functions.

To get to the list of the *Information displays*, touch first the field.

The display of *Information displays* shown below appears.



You can return to the Main display by touching the *Exit* field. By touching the *Back* field you will be returned to the previous display.

8.6.1 User preference settings

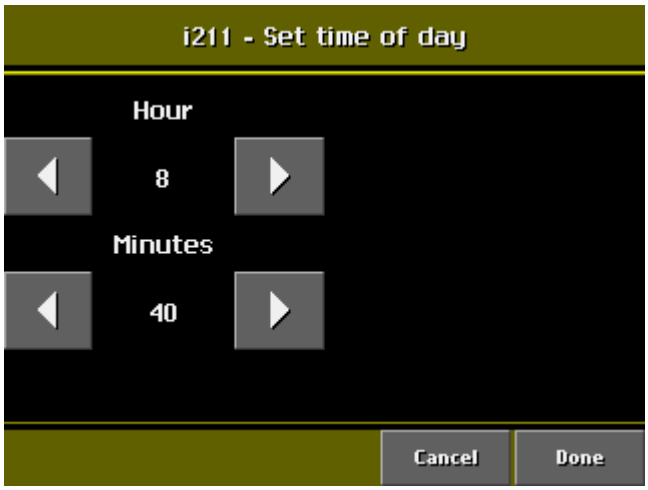
Touch the *User preference settings* on the Information displays. This mode enables you to set the time and date, perform some visual adjustments, select unit's behavioural preferences and language.

Setting date and time

NOTE ***The time is set at the factory to the local time. Change the time to show correct time/date before using the unit.***

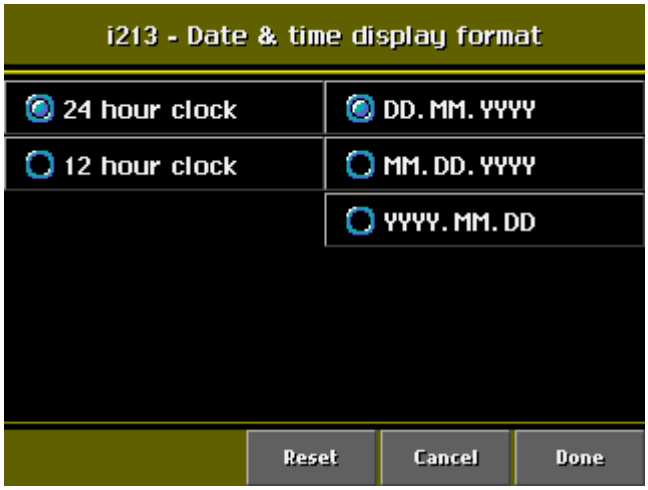
To set the time select *Set time of day* on the *Date & time* display (i210). If you want to change the date, select *Set date*.

Set the correct time with the *hour* and *minutes* arrow fields. Store the new time by touching the *Done* field or exit the mode without storing changes by touching the *Cancel* field.



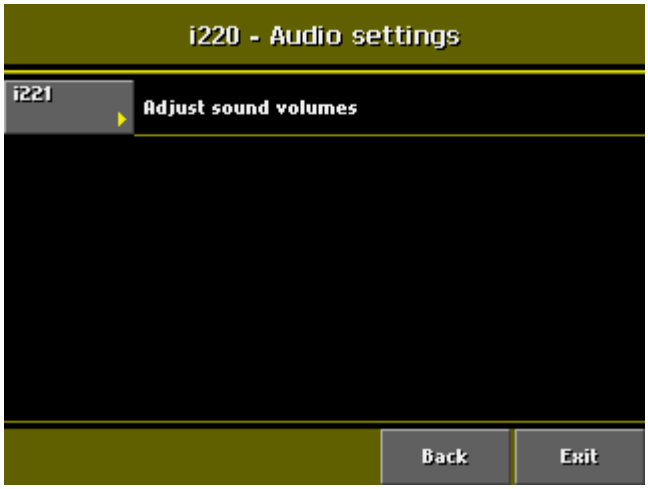
Set the correct date with the *year, month* and *day* arrow fields. Store the new date by touching the *Done* field or exit the mode without storing changes by touching the *Cancel* field.

To select the date and time display format touch the display i213. You can choose either the 12-hour or 24-hour system. There are three possibilities to choose from for the date display format. Touch the desired formats and confirm your selection by touching *Done*.



Audio settings

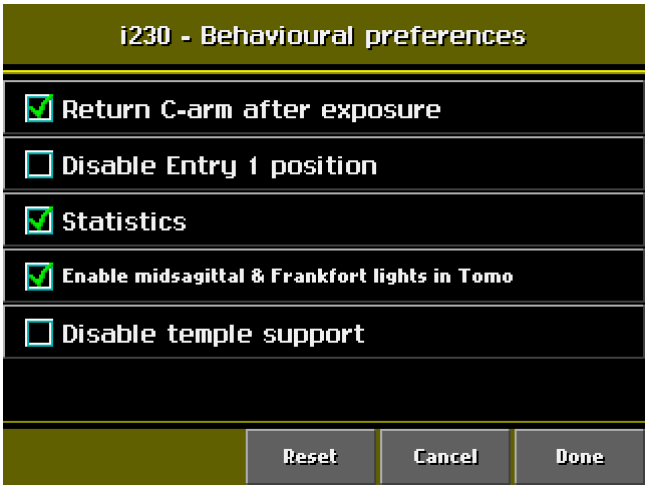
Select *Audio settings* (i220) on the *User preference settings* display to adjust the warning signal of the radiation. The range of the warning signal varies between 1 and 255.



Behavioural preferences

Select *Behavioural preferences* (i230) on the *User preference settings* display.

Confirm your selection(s) by touching *Done*. Touching the *Cancel* field will bring you back to the *User preference settings* display.



Return C-arm after exposure
You can select that the C-arm automatically returns to the Entry2 position after the exposure by touching the Return C-arm after exposure field.

Disable Entry 1 position
You can also disable the C-arm to move to the back from the patient positioning area by selecting *Disable Entry 1 position*.

Statistics
By selecting *Statistics* the radiation dose of each exposure will be displayed after the exposure is completed. The program measures the highest possible radiation dose the patient is exposed to in each exposure with the exposure values (kV, mA, time). In case the patient does not cover the whole exposure field (e.g. Ceph exposure), the real radiation dose is lower.

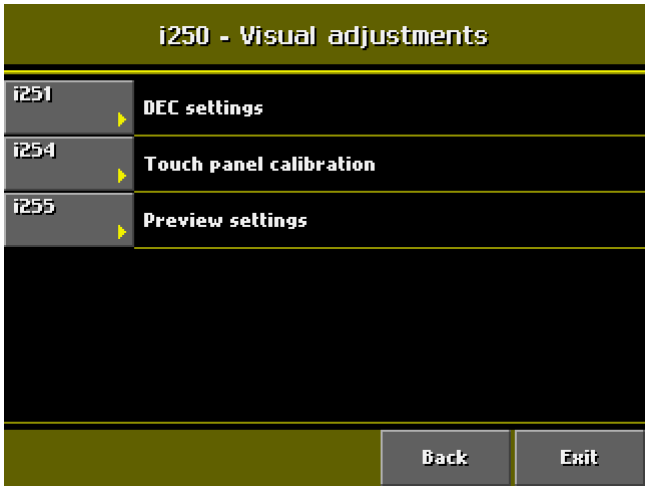
The term used for measuring the radiation dose is DAP (Dose Area Product). The DAP unit is = *mGy*cm².* Note that the DAP value is valid only if the unit is calibrated according to the ProMax calibration instructions.

Enable midsagittal & Frankfort lights in Tomo
In case you wish to have the midsagittal and Frankfort lights on in Tomo mode, select this feature. The unit must be switched off and on to confirm your selection.

Disable temple supports
The X-ray unit can be used without temple supports when the temple support motor is inactivated. Remove the temple supports after selecting the Disable temple support function.

Visual adjustments

Select *Visual adjustments* (i250) on the *User preference settings* display.

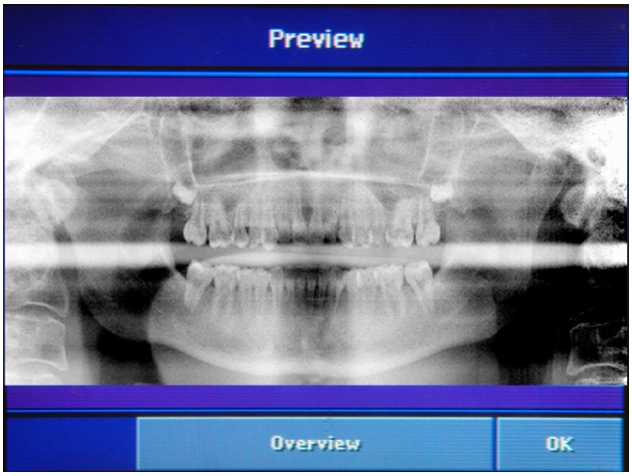


See chapter 9 “DYNAMIC EXPOSURE CONTROL (optional)” on page 63 for more information on DEC settings (i251).

Touch panel calibration display (i254) enables the user to calibrate the touch panel suitable for his/her way of touching the panel.

The *Preview settings* (i255) function allows the user to preview the X-ray image before accepting and storing the image.

NOTE ***The Preview settings function is only available for X-ray units with Ethernet network card.***

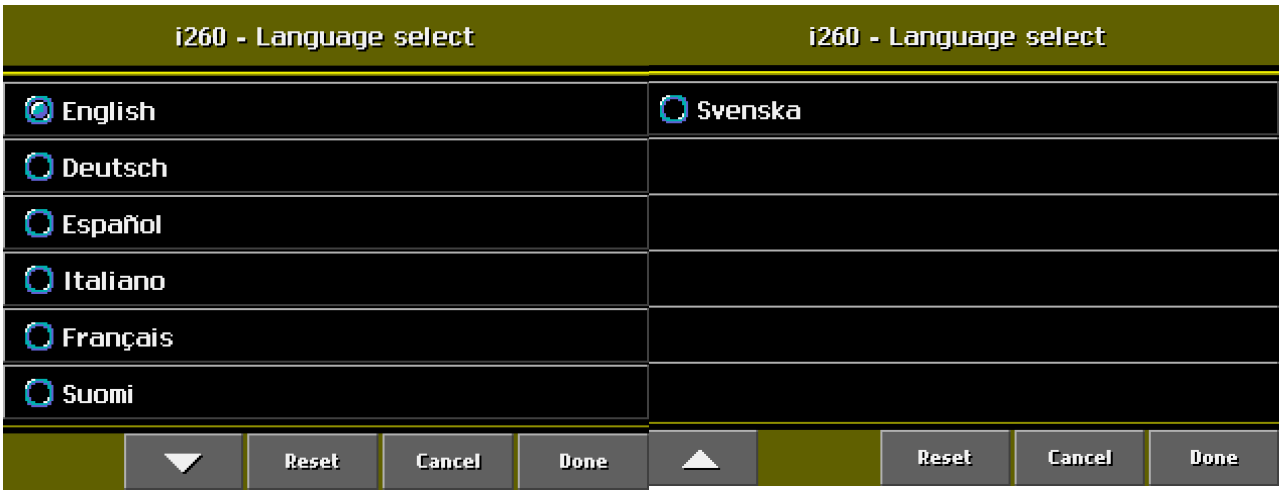


Touching the preview image will zoom the image. Return by touching "*Overview*". Accept by touching *OK*.

Language select

The language of the Graphic user interface (GUI) can be selected in the *Language select* (i260) display.

Touch the desired field to select the language. To confirm your selection touch *Done.*



Default program settings

Touch the *TMJ* field in the i270 display to change the TMJ **default angle**. Set the angle with the left and right arrows in the i27.1 display. Confirm your selection by touching *Done.* The new TMJ default angle will not come into effect until you reboot the X-ray unit.

NOTE ***The TMJ angle can be changed in the TMJ main menu.***

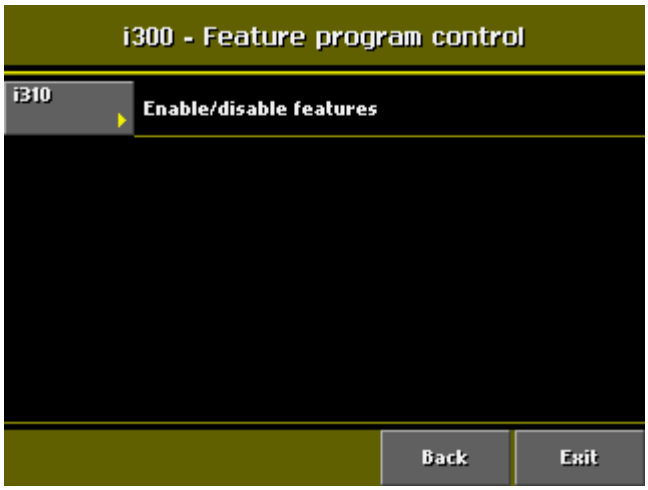
Touch *Cancel* to return to the previous display.

8.6.2 Feature program control

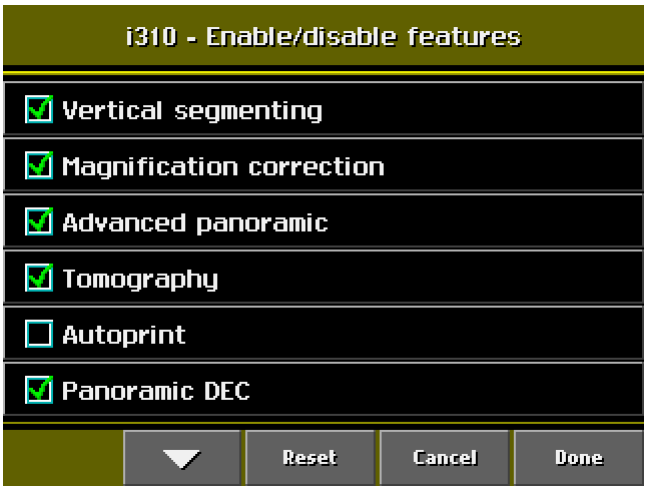
Select *Feature program control* (i300) on the *Information displays* display. In this mode new features can be added.

Enable/disable features

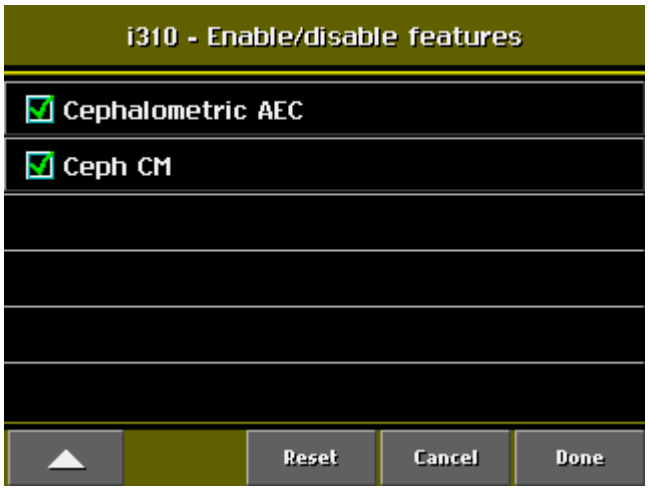
To add new exposure programs to the unit select *Enable/disable features* on the *Feature program control* display. A list of features appears.



By touching the *arrow down* field in the lower left corner more features will appear. To select the desired feature touch the specific field. Confirm the selection by touching *Done*.



Touch the *arrow up* field in the lower left corner to return to the previous display.



To select the desired feature touch the specific field. Confirm the selection by touching *Done*.

You will need special license codes to add the new feature. Touch the feature field (e.g. *Vertical segmenting)* to switch this feature on. The display shown below will appear. Enter the license code you have received to enable the selected feature to the unit.

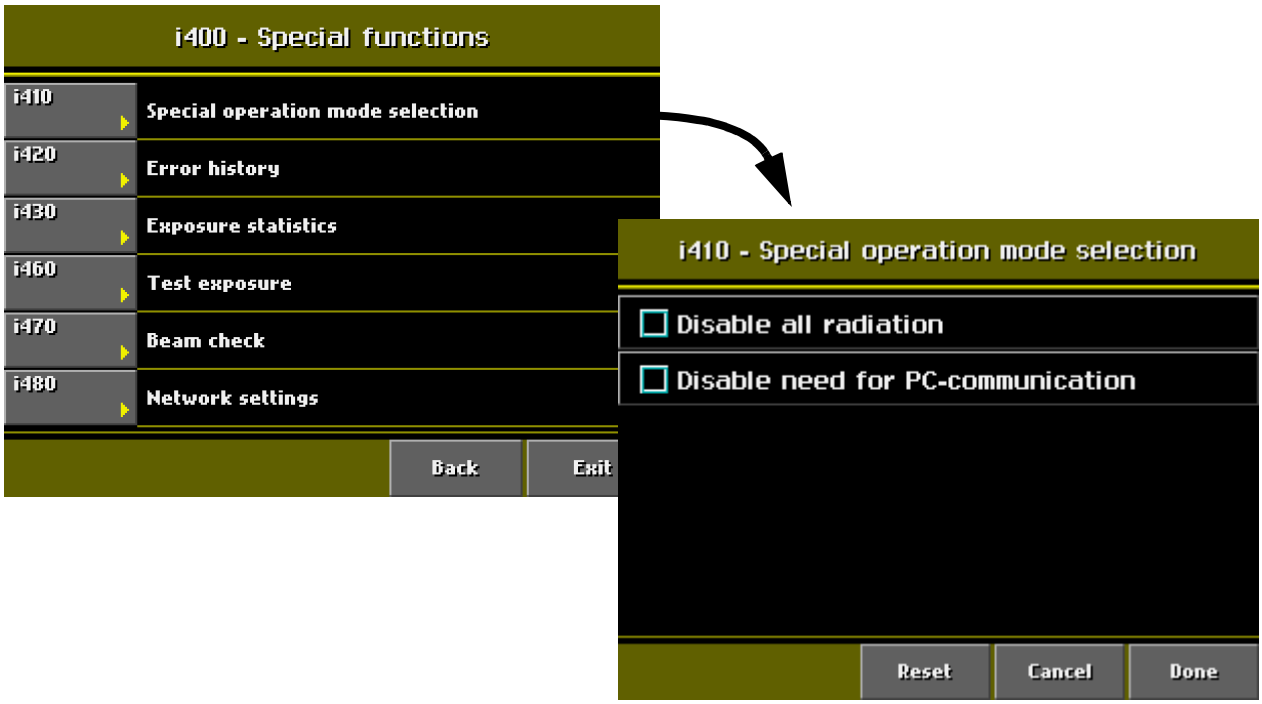
To disable the selected feature repeat the procedure.

NOTE ***After enabling/disabling a new feature the unit must be switched off and on.***

NOTE ***Each license code is unit and module specific, i.e. it can only be used on the specified unit and for the specified program module.***

8.6.3 Special functions

Select *Special functions* (i400) on the *Information displays*. In this mode some special operation modes can be selected. Select *Special operation mode selection* on the *Special functions* display. The display shown below appears.



Disable all radiation
This option allows you to switch the exposure function on or off.

When the exposure function is switched off no radiation is generated when you press the exposure button. The C-arm will move normally but no radiation will be generated and no radiation warning signals will be given, i.e. this is a “dummy run” function for training and demonstration purposes. For example, you might want to demonstrate the C-arm movements before taking exposures of children or nervous patients.

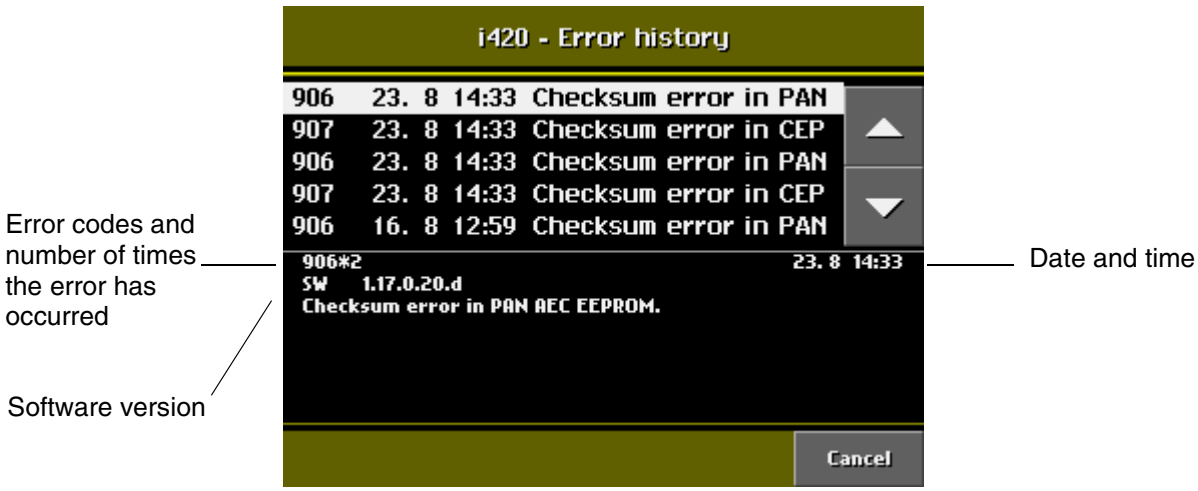
Touch the *Disable all radiation* field to switch the exposure function on. Touch the *Disable all radiation* field again to switch the exposure function off (empty the check box).

Disable need for PC communication
This option allows you to demonstrate the ProMax digital X-ray unit without PC connected to the unit. If the Dimaxis software is switched on and waiting for Ready the PC communication can not be disabled. Switch off the Dimaxis software before disabling the PC communication.

Error history

This function shows the last 100 error messages of the program. Furthermore, another 40 tube head error messages are shown on the list. You can select the message by scrolling up and down with the arrow keys.

The selected message is shown more detailed (error code number, time, software version of the unit etc.) on lower part of the display.

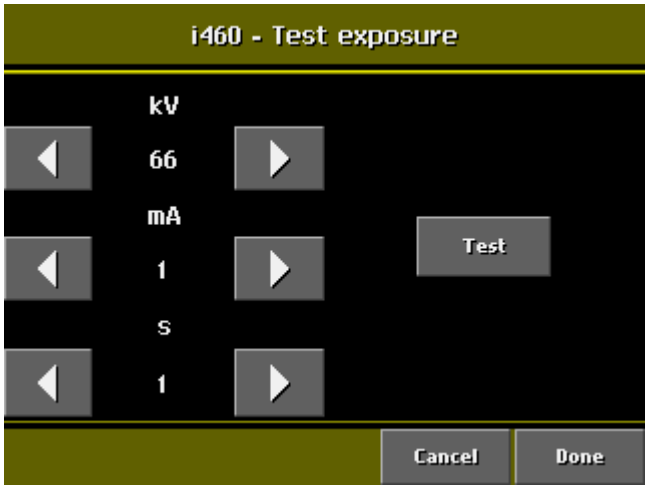

i420 - Error history
906 23. 8 14:33 Checksum error in PAN
907 23. 8 14:33 Checksum error in CEP
906 23. 8 14:33 Checksum error in PAN
907 23. 8 14:33 Checksum error in CEP
906 16. 8 12:59 Checksum error in PAN
906*2
23. 8 14:33
SW 1.17.0.20.d
Checksum error in PAN AEC EEPROM.
Cancel
Error codes and number of times the error has occurred
Software version
Date and time

Exposure statistics

This function shows e.g. the data of the last exposure taken, counts the number of exposures taken in different modes and shows the total exposure time of the unit.

Test exposure

This function allows you to select kV and mA values as well as the correct time for a test exposure.



Beam check

This feature allows the user to check that the X-ray unit's tube head is properly collimated on the image receptor.

See Beam Check Application - User's Manual for more information.

Network settings

Refer to ProMax technical manual for further information on network settings.

9 DYNAMIC EXPOSURE CONTROL (optional)

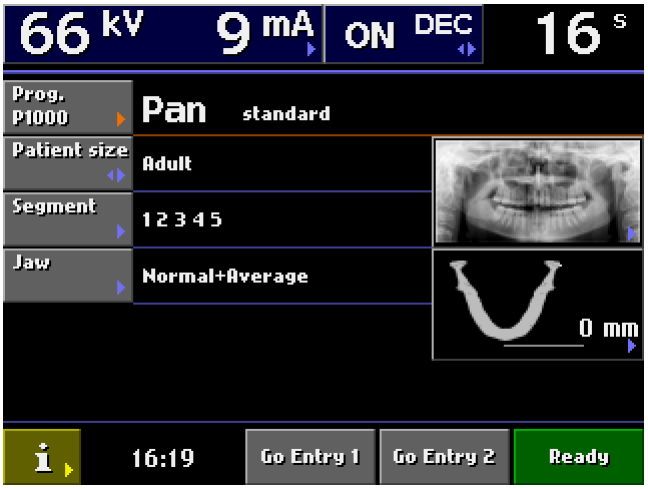
The Dynamic Exposure Control (DEC) is used for producing consistent density image of a patient to make the anatomical information value optimal. The correct exposure values are automatically adjusted regardless of the anatomic shape and structure of the jaw or bone density.

9.1 Using the DEC function

If your unit is equipped with the DEC function it can be activated by touching the *DEC* field on the top of the main menu in the **panoramic and cephalometric mode.** When the DEC function is activated it automatically selects the kV and mA starting values based on the patient and the jaw size for optimal exposure. Selecting the right patient and jaw size will assist DEC operation.

The kV and mA values can be adjusted in the **panoramic mode.** The scale of the kV value is between 54kV and 84kV and it can be adjusted by + 4kV to - 4kV. Note that if the kV value is e.g. 82kV it can only be increased by 2kV.

The scale of the mA value is between 1mA and 16mA and it can be adjusted by + 4mA to - 3mA. Note that if the mA value is e.g. 15mA it can only be increased by 1mA.



NOTE ***It is possible but not recommended to modify the default kV and mA starting values.***

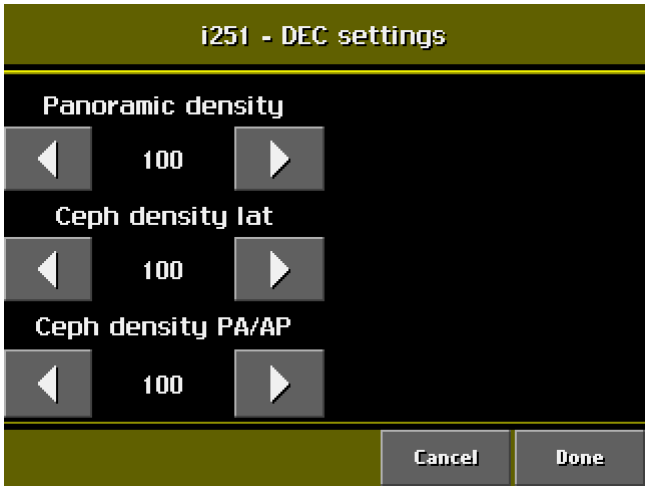
NOTE ***Dramatic change of the kV and mA values may yield to an incomplete DEC function.***

NOTE ***The DEC function can be used in the panoramic and cephalometric modes.***

NOTE ***The DEC function is not available when the PC communication is disabled.***

9.2 Setting the DEC density

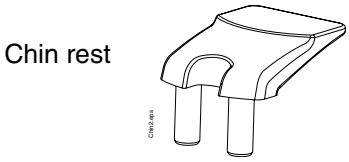
If you need to adjust the DEC density set the exposure parameters higher or lower by using the panoramic density function (indicated as per cent) on the *DEC settings* menu i251.

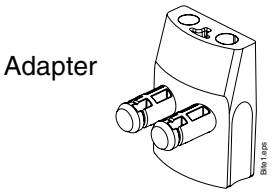


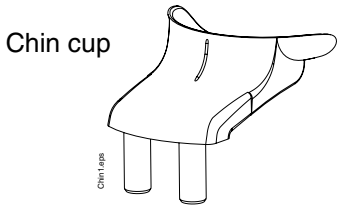
The scale of the density is 20 - 200%. The recommended target signal is 100%.

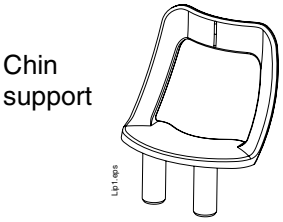
NOTE ***The DEC function is not possible in the high resolution mode.***

10 PANORAMIC EXPOSURE









This procedure will produce a full size panoramic exposure of both jaws. If the child setting is selected, the width and height of the exposed area will be slightly reduced. You can also take a segment exposure by selecting only certain vertical or horizontal segments of the jaw, refer to section 8.2.1 “Selecting segmentation (optional)” on page 39.

Use a bite piece for this procedure. Insert the chin rest and a bite piece into the adapter. Insert the adapter into the holes in the patient support table.

Alternatively, for edentulous patients or for patients who are unable to use the bite piece, you can use both the chin support and the chin cup for panoramic exposures. You may have to place a roll of gauze or cotton between the patient’s jaws to raise the upper ridge to the correct position.

Select the panoramic program you require, refer to section 8.2 “Selecting panoramic exposure program” on page 37.

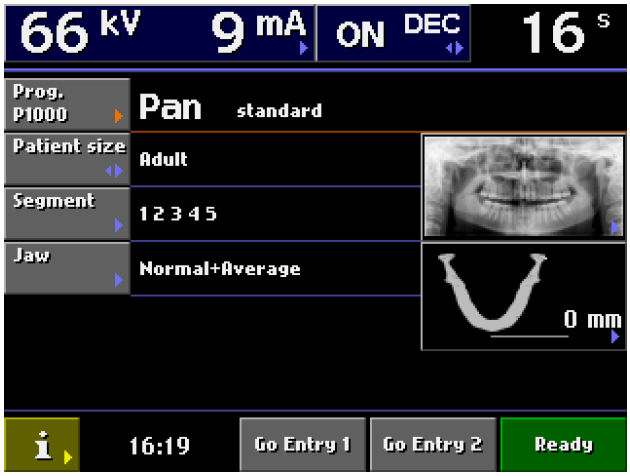
Select the correct exposure parameters for the patient being X-rayed according to the values in the following table.

NOTE ***If the required diagnostic value can be reached with lower mA values than the following table indicates, you can use those lower values.***
Always try to minimize the radiation dose to the patient.

PANORAMIC EXPOSURE VALUES

PATIENT	Normal resolution		Enhanced resolution	
	kV VALUE	mA VALUE	kV VALUE	mA VALUE
Child up to 6 years of age	60	4	62	5
Child 7-12 years of age	62	6	64	8
Adult female or small male	64	7	66	9
Adult male	66	8	68	13
Large adult male	68	9	70	14

NOTE ***When you have made all the necessary selections move the C-arm to the patient entry position if it is not already there.***



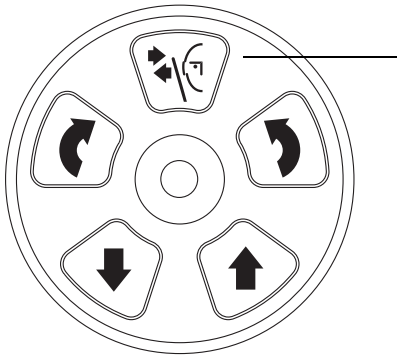
OR

Full view position

Traditional view position

Prepare the patient for the exposure as described in section 6.2 “Preparing the patient” on page 31.

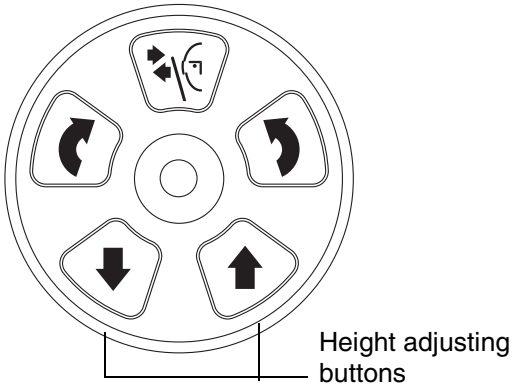
10.1 Patient positioning



Press the temple support button to open the temple supports if they are not already open.

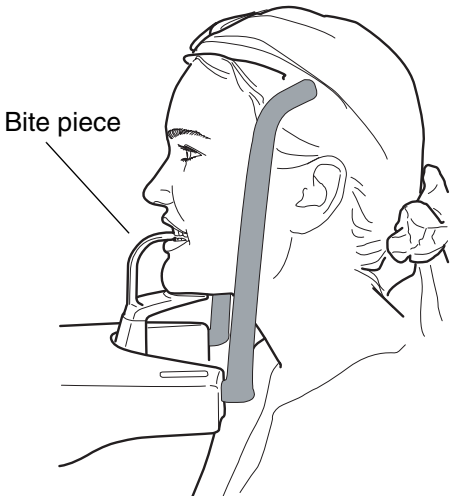
The temple supports can be closed by pressing the temple support button again.

Guide the patient to the unit so that they are facing the chin rest.

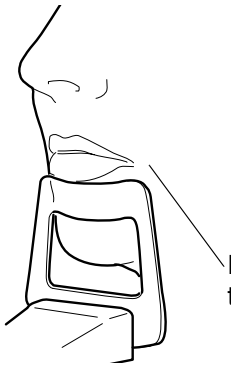


To adjust the height of the unit, press either of the height adjusting buttons until the chin rest is on the level of the patient’s chin. Stretch and straighten the patient’s neck.

The telescopic column moves slowly at first, then faster.

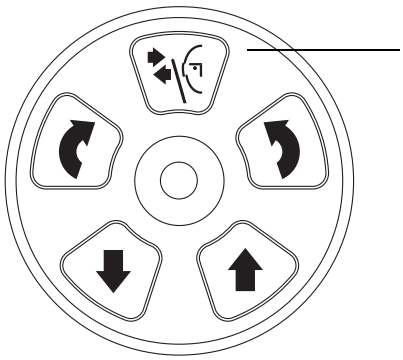


Ask the patient to step forward, grasp the patient handles, stretch up and bite the bite piece. The incisal edges of the maxillary and mandibular teeth must be in the groove in the bite piece.



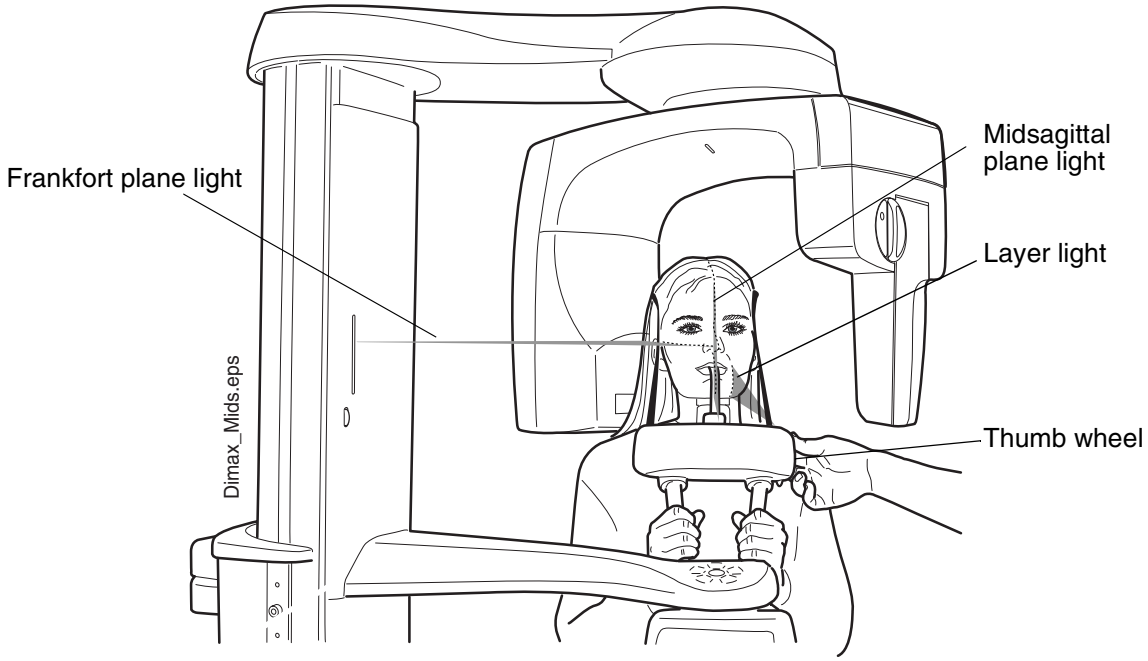
NOTE ***If you are using the chin support, position the patient so that the chin, just below the lower lip, touches the top bar.***

NOTE ***If you are using chin cup or support use for example roll gauze to ensure that the patient's teeth are together.***

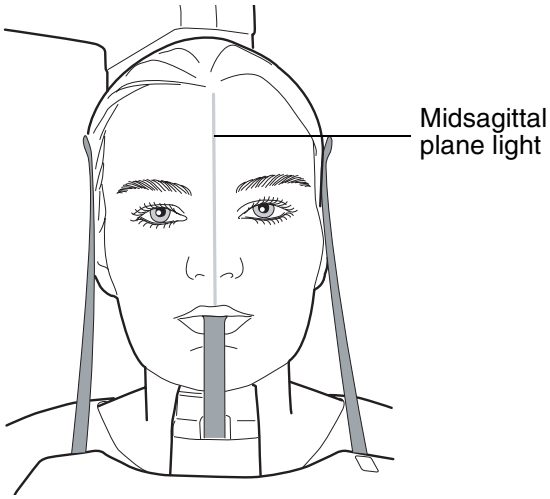


Close the temple supports by pressing the temple support button.

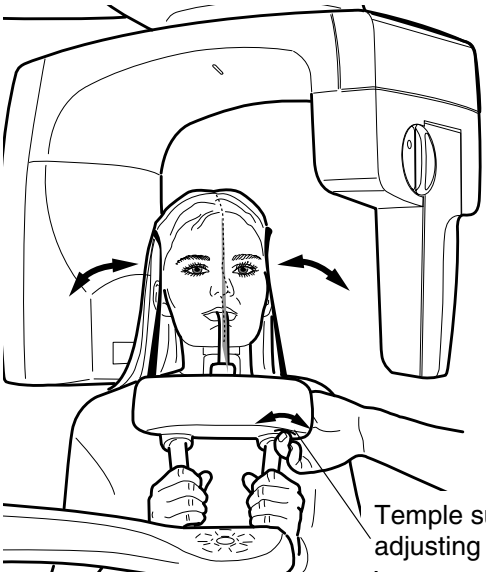
Move the thumb wheel of the layer light slightly to switch the three patient positioning lights on so that the patient can be positioned. The layer light thumb wheel is located on the underside of the patient support table. Note that the lights will automatically switch off after 2 minutes. If the lights go out before you have positioned the patient move the layer light thumb wheel again to switch the lights back on.



Stand behind the patient and make sure that the patient's shoulders are level and the neck muscles relaxed.



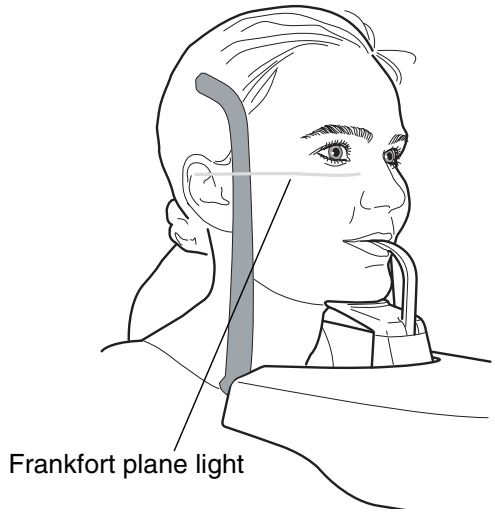
Position the patient's head so that the midsagittal plane coincides with the midsagittal plane light beam. Make sure that the patient is looking straight ahead as the light may appear to be correctly positioned but the patient's head could be turned slightly to one side.



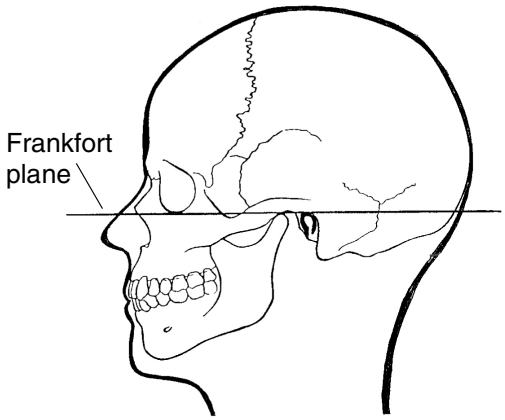
Note that you can adjust the position of the temple supports if needed. This will only be necessary if the patient has an asymmetrical face and the midsagittal plane light is not in the middle of the patient's face.

To do the adjustment, lift first the temple support adjusting lever and move it then left or right until you have positioned the patient's head so that the midsagittal plane light coincides with the midsagittal plane. The temple support adjusting lever is located on the underside of the patient support table.

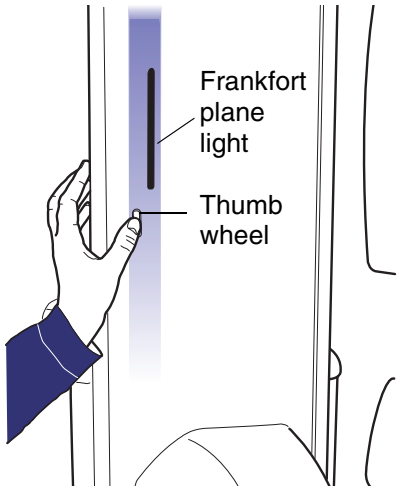
NOTE ***The temple support adjusting lever must be returned to the middle position before the next patient is positioned to the unit.***



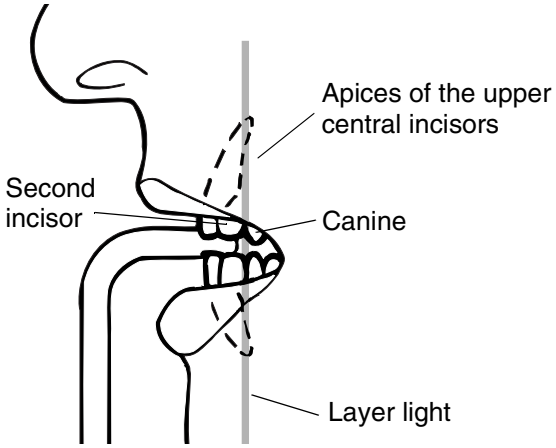
Position the patient's head so that the Frankfort plane coincides with the Frankfort plane light beam. To do this support the back of the patient's head with your hand and adjust the tilt of the patient's head by raising or lowering the unit with the height adjusting buttons. The patient's back should be straight. If necessary, stretch and straighten the patient's neck by moving the unit up slightly.



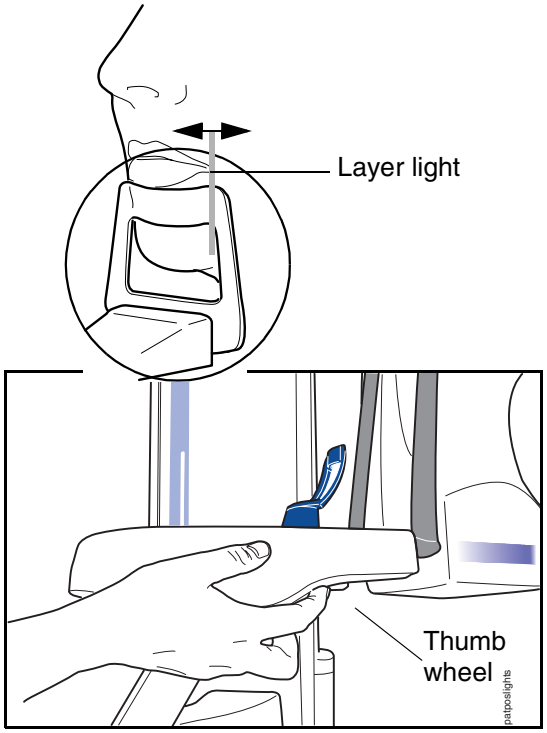
The Frankfort plane is a plane which joins the infra-orbital point to the superior border of the external auditory meatus.



Note that the Frankfort plane light, located on the side of the column, can be moved up or down to accommodate different head sizes. This is done by rotating the thumb wheel that is located below the light slot.



Position the apices of the patient's upper central incisors within the image layer (focal trough) of the unit.



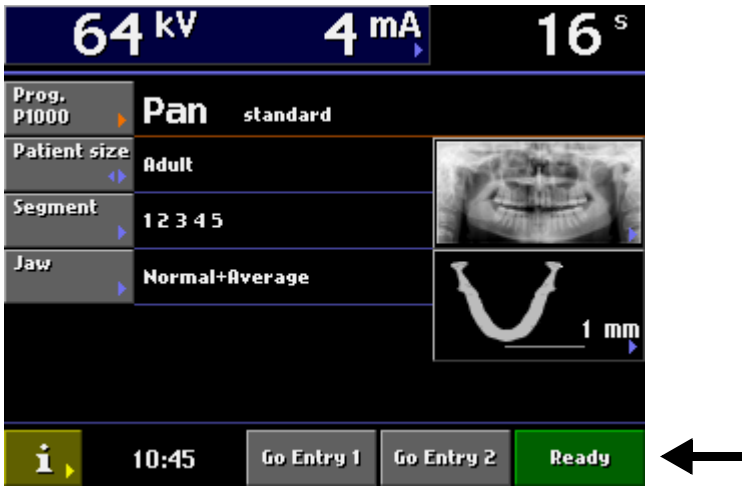
To do this rotate the thumb wheel located on the underside of the patient support table to move the layer light, which indicates the centre of the focal trough, until it falls between the second incisor and the canine. For an average patient, this procedure will place the apices of the upper central incisors within the focal trough.

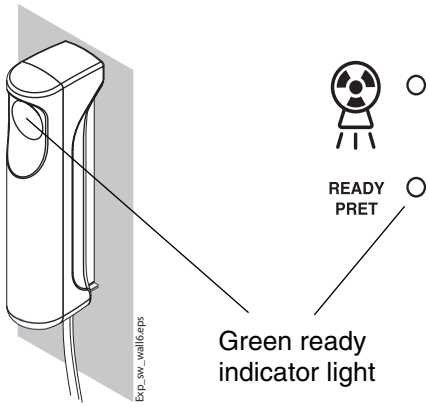
Check that the Frankfort plane light and the midsagittal plane light are still correctly positioned. Reposition them if necessary.

NOTE ***Make sure that you have selected the right patient and the panoramic exposure mode in the Dimaxis software program before you take an exposure. Refer to the Dimaxis User's Manual.***

10.2 Taking an exposure

When you are ready to take an exposure touch the *Ready* field on the main display. The unit will move to the Ready position for the selected panoramic exposure program.





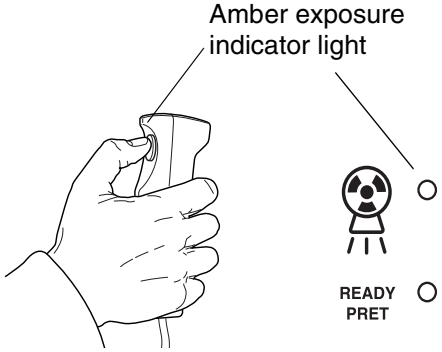
On the exposure button and on the control panel a green indicator light will come on. Additionally, the word *READY* will be shown on the control panel display. The Dimaxis program will show the *Waiting for Ready* message on the computer screen.

The green indicator lights and the word *READY* will flash while the unit moves to the Ready position. They will stop flashing when the unit has reached the ready position for the selected panoramic exposure program. The Dimaxis program will now show the *Waiting for Exposure* message on the computer screen.

Ask the patient to close their lips on the bite piece, swallow, place their tongue flat against the roof of the mouth, breathe normally, and stand as still as possible.

Alternatively, for edentulous patients or for patients who are unable to use the bite piece, you can use both the chin support and the chin cup for panoramic exposures. You may have to place a roll of gauze or cotton between the patient's jaws to raise the upper ridge to the correct position.

Move to a protected area. In case you do not have a protected area available, move at least two meters (seven feet) from the X-ray. Protect yourself from radiation.



Press and hold down the exposure button for the duration of the exposure. The C-arm will move through one exposure cycle. During the exposure cycle the radiation warning lights on the exposure switch and on the control panel will come on and you will hear the radiation warning tone. When the C-arm has completed the exposure cycle the temple supports will automatically open. You can now guide the patient from the unit.

NOTE ***Maintain audio and visual contact with the patient and unit during exposure. If the C-arm stops moving during exposure, release the exposure button immediately.***

You can now drive the C-arm to the entry position by touching the *Go Entry 1* or *Go Entry 2* field in the display.

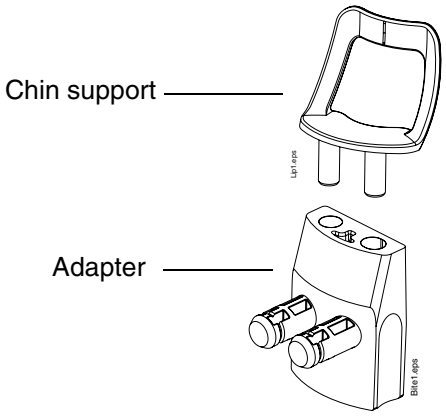
NOTE ***If the "Auto return" function is switched on, the C-arm will automatically return to the ready position at the end of the exposure. Refer to section 8.6.1 "User preference settings" on page 51 for more information.***

NOTE ***If a large number of exposures is taken in rapid succession the X-ray tube may overheat and a cooling time will flash in the display (e.g. 00:42). The cooling time indicates the delay before the next exposure can be taken.***

When you have taken the exposure the image will be shown on the computer screen. **Note that you must accept the image by clicking the "OK" button - only accepted images will be stored in the database.** Refer to the Dimaxis User's Manual for further information.

11 TEMPOROMANDIBULAR JOINT (TMJ) EXPOSURE

11.1 Double TMJ exposure (lateral, PA or lateral-PA)



This procedure will produce open and closed views of the left and right temporomandibular joints.

Before taking a true profile TMJ exposure determine the angles at which the long axes of the condyles are from the transcranial line. To do this take a submental vertex exposure of the patient and measure the condyle angles. Adjust the angle according to the instructions for 5.2 “Temporomandibular joint (TMJ) exposure programs” on page 14).

NOTE ***In case you do not adjust the angle the exposure program will use a default value of 17°.***

Note that this is a double exposure and the C-arm will travel through two exposure cycles.

Use the chin support for this exposure. Insert the chin support into the adapter. Insert the adapter into the holes in the patient support table.

11.1.1 First exposure - jaw closed

Select the double TMJ exposure program you require, refer to section 8.3 “Selecting temporomandibular joint (TMJ) exposure program” on page 41.

Select the correct exposure parameters for the patient being X-rayed according to the values in the following table. Note that there are two sets of kV values: one set for the closed jaw and a second set for the open jaw.

NOTE ***If the required diagnostic value can be reached with lower mA values than the following table indicates, you can use those lower values. Always try to minimize the radiation dose to the patient.***

NOTE ***Increase the kV value in the enhanced resolution mode by 2 kV and the mA value by 2 mA.***

TEMPOROMANDIBULAR JOINT EXPOSURE VALUES (double TMJ lateral)

PATIENT	kV VALUE		mA VALUE
	Jaw closed	Jaw open	
Child up to 6 years of age	62	60	5
Child 7-12 years of age	64	62	6
Adult female or small male	66	64	7
Adult male	68	66	8
Large adult male	70	68	9

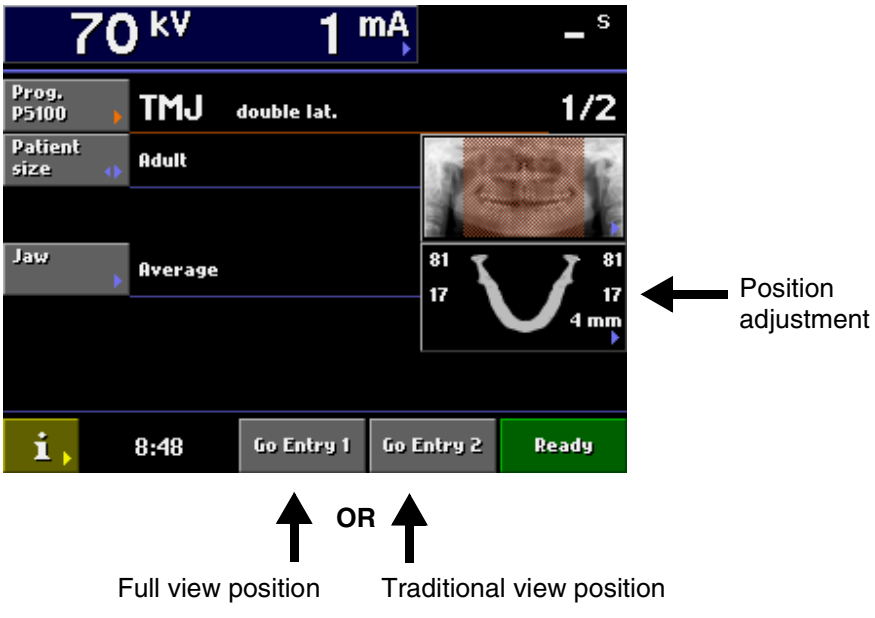
TEMPOROMANDIBULAR JOINT EXPOSURE VALUES (double TMJ PA)

PATIENT	kV VALUE		mA VALUE
	Jaw closed	Jaw open	
Child up to 6 years of age	64	62	5
Child 7-12 years of age	66	64	6
Adult female or small male	68	66	7
Adult male	70	68	8
Large adult male	72	70	9

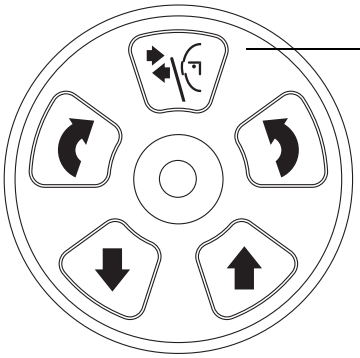
TEMPOROMANDIBULAR JOINT EXPOSURE VALUES (double TMJ lat-PA)

PATIENT	kV VALUE		mA VALUE
	Jaw closed	Jaw open	
Child up to 6 years of age	62	60	5
Child 7-12 years of age	64	62	6
Adult female or small male	66	64	7
Adult male	68	66	8
Large adult male	70	68	9

NOTE ***When you have made all the necessary selections move the C-arm to the patient entry position if it is not already there.***



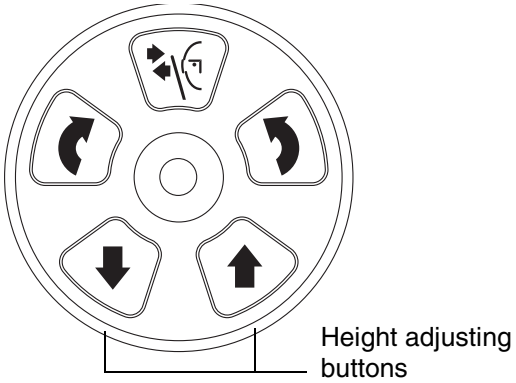
Prepare the patient for the exposure as described in section 6.2 “Preparing the patient” on page 31.



Press the temple support button to open the temple supports if they are not already open.

The temple supports can be closed by pressing the temple support button again.

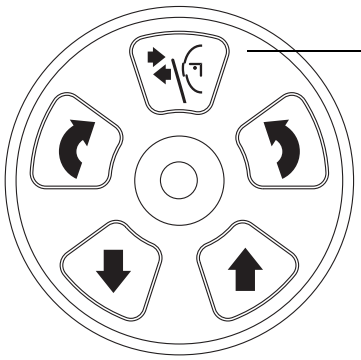
Guide the patient to the unit so that they are facing the chin support. Explain to the patient that you will take a double exposure and that the unit will rotate twice.



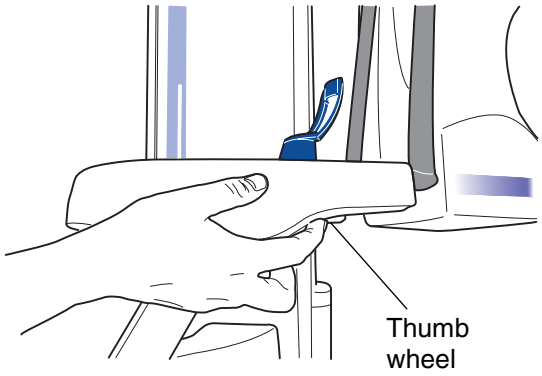
To adjust the height of the unit, press either of the height adjusting buttons until the opening in the chin support is approximately level with the patient's mouth.

The telescopic column moves slowly at first, then faster.

Ask the patient to step forward, grasp the patient handles and press their lips against the chin support. The patient's nose must rest on top of the support and their mouth must be closed, their teeth together.

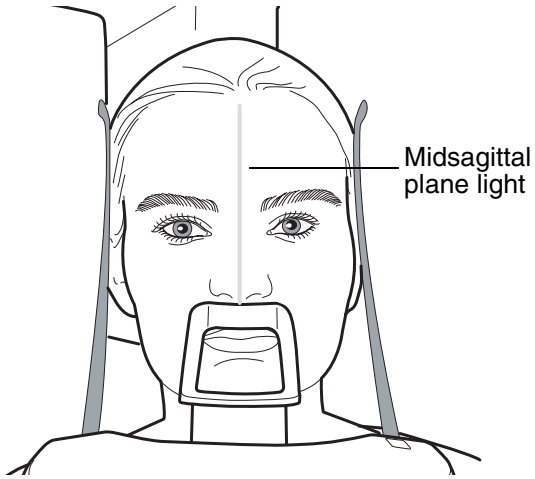


Close the temple supports by pressing the temple support button.



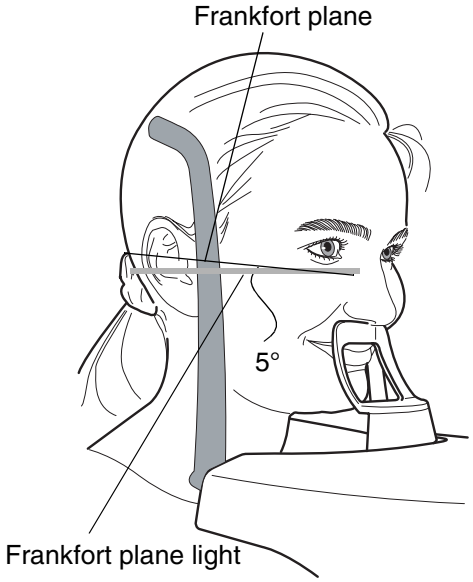
Move the thumb wheel that is located on the underside of the patient support table to switch on the patient positioning lights so that the patient can be positioned. Note that the lights will automatically switch off after 2 minutes. If the lights go out before you have positioned the patient move the thumb wheel again to switch the lights back on.

Stand behind the patient and check that the patient's shoulders are level and the neck muscles relaxed.

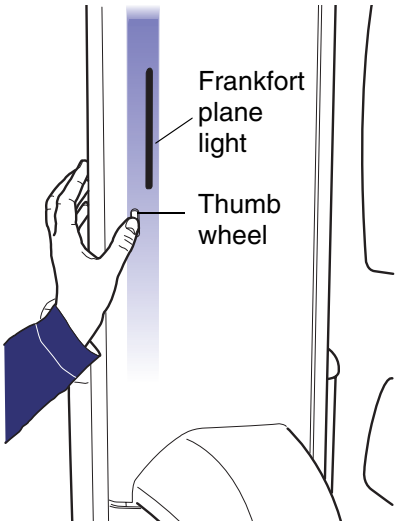


Position the patient's head so that the midsagittal plane coincides with the midsagittal plane light beam. Make sure that the patient is looking straight ahead as the light may appear to be correctly positioned but the patient's head could be turned slightly to one side.

Note that you can adjust the position of the temple supports if needed. This will only be necessary if the patient has an asymmetrical face and the midsagittal plane light is not in the middle of the patient's face. For more information, refer to page 69.



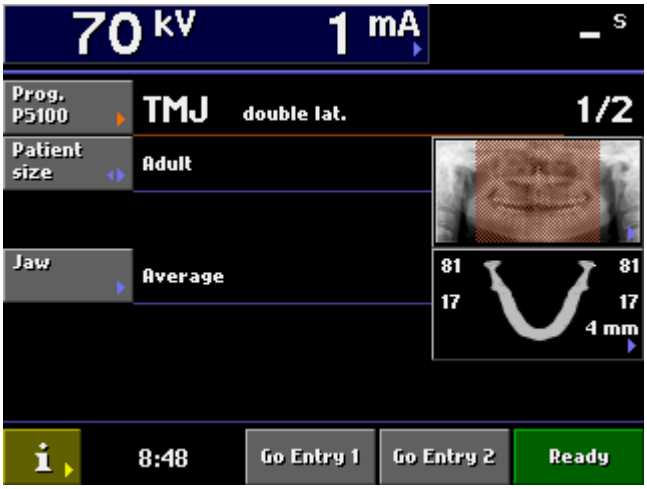
Position the patient's head so that the Frankfort plane is tilted down 5 degrees. To do this support the back of the patient's head with your hand and, using the Frankfort plane light as a reference line, adjust the position of the patient's head by raising or lowering the unit with the height adjusting buttons. Make sure the patient's back is straight.

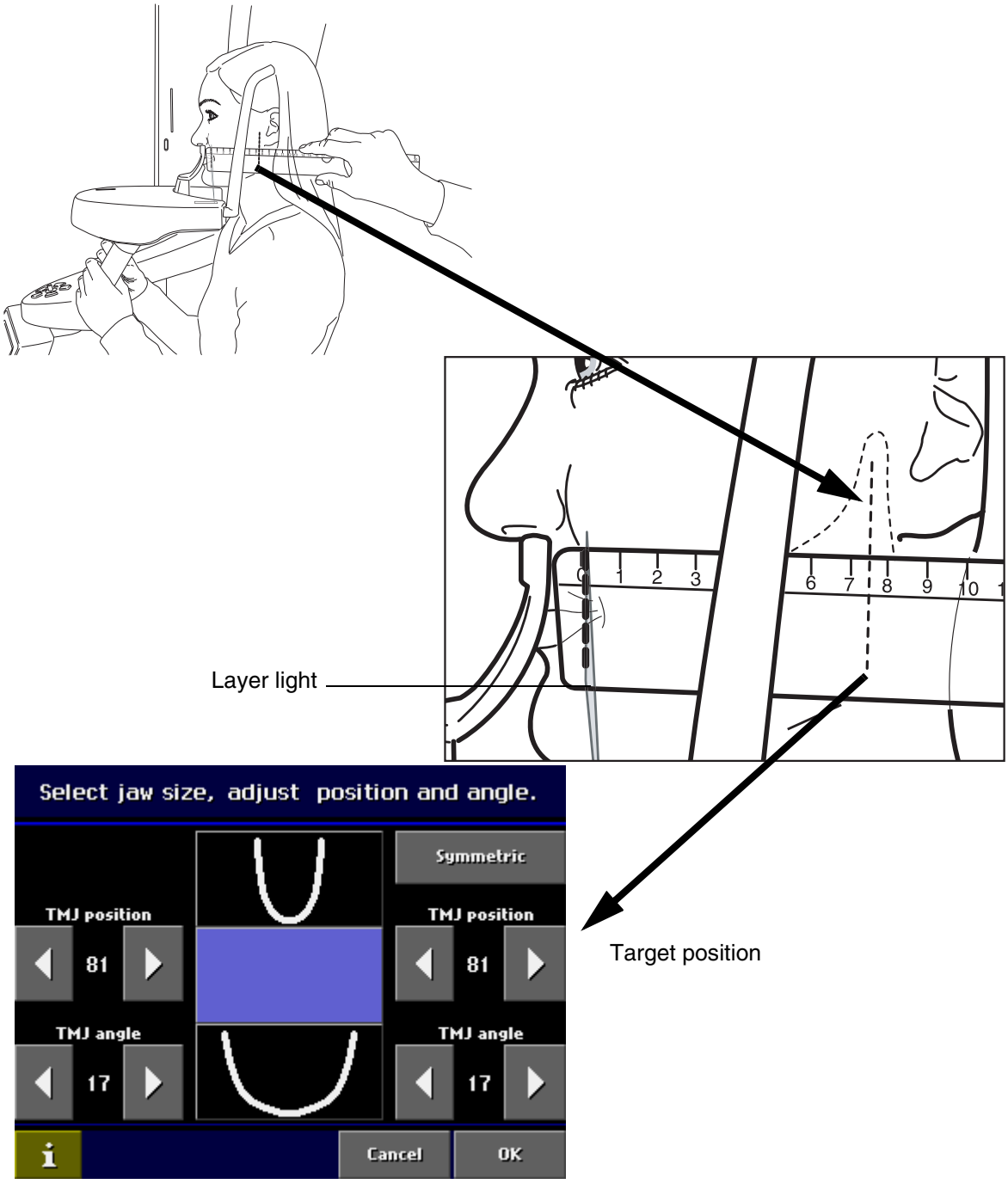


Note that the Frankfort plane light, located on the side of the column, can be moved up or down to accommodate different head sizes. This is done by rotating the thumb wheel that is located below the light slot.

In SCARA3 units:
In TMJ exposures the target area and angle can be adjusted with the arrow fields. Use a ruler to measure the distance between the patient's joint and X-ray beam to position the target area correctly.

Touch the jaw icon. Adjust the target position and angle with the arrows according to your measurements.



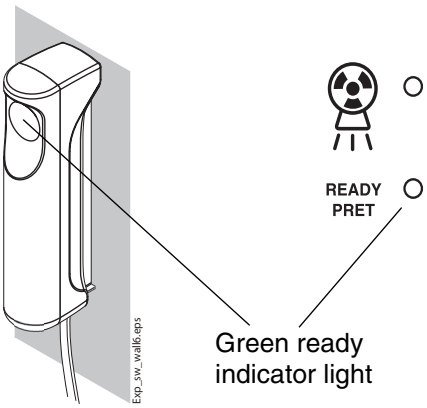


NOTE ***The layer light position affects directly the selected position value. On retakes always measure the position. Do not rely on numeric position value.***

NOTE ***To find out the correct angle use the submento-vertex image (axial projection).***

NOTE ***Make sure that you have selected the right patient and the panoramic exposure mode in the Dimaxis software program before you take an exposure. Refer to the Dimaxis User's Manual.***

When you are ready to take an exposure touch the *Ready* field on the main display. The unit will move to the ready position for the selected double TMJ exposure program.

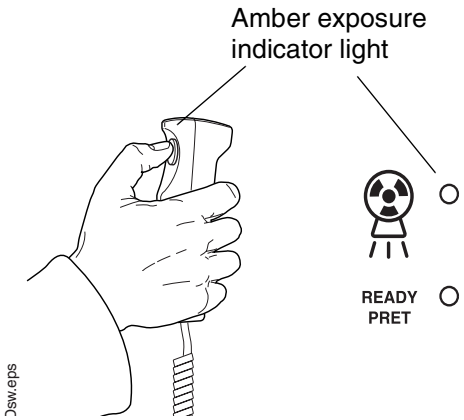


On the exposure button and on the control panel a green indicator light will come on. Additionally, the word *READY* will be shown on the control panel display. The Dimaxis program will show the *Waiting for Ready* message on the computer screen.

The green indicator lights and the word *READY* will flash while the unit moves to the ready position. They will stop flashing when the unit has reached the ready position for the selected double TMJ exposure program. The Dimaxis program will now show the *Waiting for Exposure* message on the computer screen.

Ask the patient to stand as still as possible.

Move to a protected area. In case you do not have a protected area available, move at least two meters (seven feet) from the X-ray. Protect yourself from radiation.

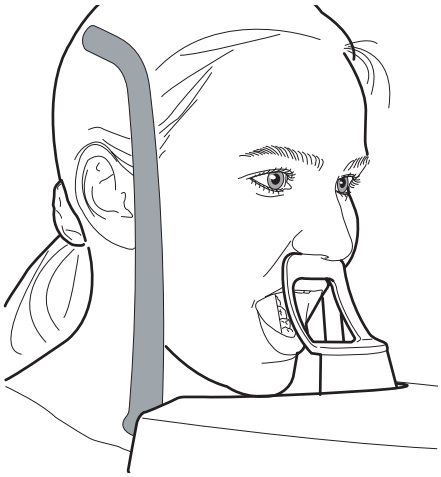


Press and hold down the exposure button for the duration of the exposure. The C-arm will move through one complete exposure cycle and return automatically to the *Ready* position. The temple supports will remain closed and hold the patient in position for the second exposure. During the exposure cycle the radiation warning lights on the exposure switch and on the control panel will come on and you will hear the radiation warning tone.

NOTE ***Maintain audio and visual contact with the patient and unit during exposure. If the C-arm stops moving during exposure, release the exposure button immediately.***

NOTE ***If a large number of exposures is taken in rapid succession the X-ray tube may overheat and a cooling time will flash in the display (e.g. 00:42). The cooling time indicates the delay before the next exposure can be taken.***

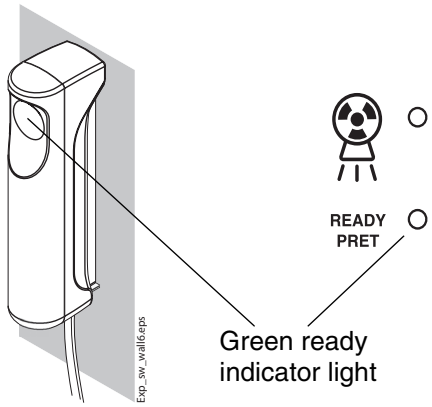
11.1.2 Second exposure - jaw open



NOTE ***Reduce the kV value by 2kV for the open jaw exposure. Refer to the table on page 73.***

NOTE ***You can also move the target area forwards by 10 mm (SCARA3 units). (Not in PA projections).***

Ask the patient to open their mouth as far as possible. Make sure that the patient's top lip is still touching the chin support.

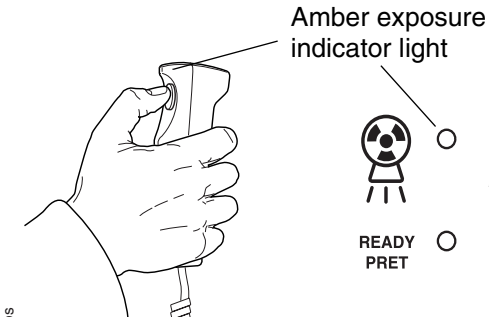


When you are ready to take the second exposure touch the *Ready* field on the main display.

On the exposure button and on the control panel a green indicator light will come on. Additionally, the word *READY* will be shown on the control panel display. The Dimaxis program will show the *Waiting for Exposure* message on the computer screen.

Ask the patient to stand as still as possible.

Move to a protected area. In case you do not have a protected area available, move at least two meters (seven feet) from the X-ray. Protect yourself from radiation.



Press and hold down the exposure button for the duration of the second exposure. During the exposure cycle the radiation warning lights on the exposure switch and on the control panel will come on and you will hear the radiation warning tone. When the C-arm has completed the second exposure cycle the temple supports will automatically open. You can now guide the patient from the unit.

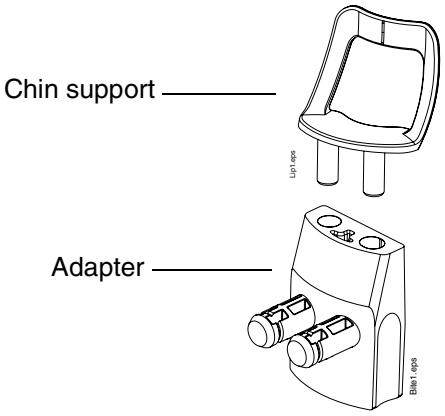
NOTE ***Maintain audio and visual contact with the patient and unit during exposure. If the C-arm stops moving during exposure, release the exposure button immediately.***

You can drive the C-arm to the entry position by touching the *Go Entry 1* or *Go Entry 2* field in the display.

NOTE ***If a large number of exposures is taken in rapid succession the X-ray tube may overheat and a cooling time will flash in the display (e.g. 00:42). The cooling time indicates the delay before the next exposure can be taken.***

When you have taken the exposure the image will be shown on the computer screen. **Note that you must accept the image by clicking the "OK" button - only accepted images will be stored in the database.** Refer to the Dimaxis User's Manual for further information.

11.2 Multi-angle TMJ exposure (PA or lat)



This procedure will produce three exposures with different angles from the left or right temporomandibular joint.

NOTE ***Place the upper lip against the chin support in order to get correct TMJ exposures.***

Note that the C-arm will travel through three exposure cycles.

Use the chin support for this exposure. Insert the chin support into the adapter. Insert the adapter into the holes in the patient support table.

Select the multi-angle TMJ exposure program you require, see section 8.3 “Selecting temporomandibular joint (TMJ) exposure program” on page 41.

Select the correct exposure parameters for the patient being X-rayed according to the values in the following table.

NOTE ***If the required diagnostic value can be reached with lower mA values than the following table indicates, you can use those lower values. Always try to minimize the radiation dose to the patient.***

NOTE ***Increase the kV value in the enhanced resolution mode by 2 kV and the mA value by 2 mA.***

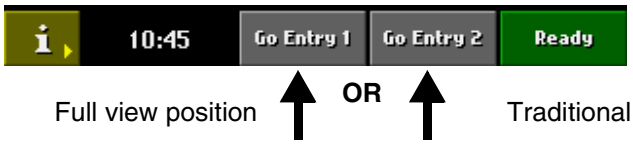
TEMPOROMANDIBULAR JOINT EXPOSURE VALUES (multi-angle TMJ lateral)

PATIENT	kV VALUE	mA VALUE
Child up to 6 years of age	62	4
Child 7-12 years of age	64	5
Adult female or small male	66	6
Adult male	68	7
Large adult male	70	8

TEMPOROMANDIBULAR JOINT EXPOSURE VALUES (multi-angle TMJ PA)

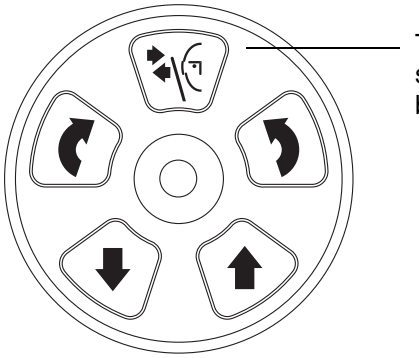
PATIENT	kV VALUE	mA VALUE
Child up to 6 years of age	64	5
Child 7-12 years of age	66	6
Adult female or small male	68	7
Adult male	70	8
Large adult male	72	8

When you have made all the necessary selections move the C-arm to the patient entry position if it is not already there.



Prepare the patient for the exposure as described in section 6.2 “Preparing the patient” on page 31.

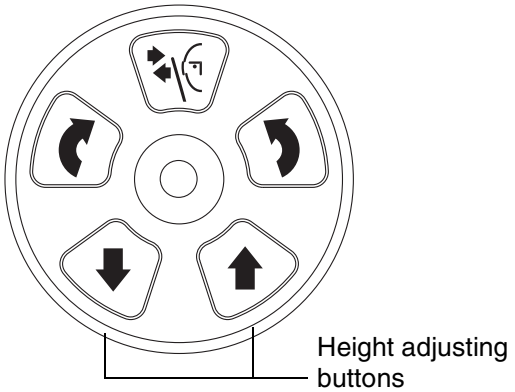
11.2.1 Patient positioning



Press the temple support button to open the temple supports if they are not already open.

The temple supports can be closed by pressing the temple support button again.

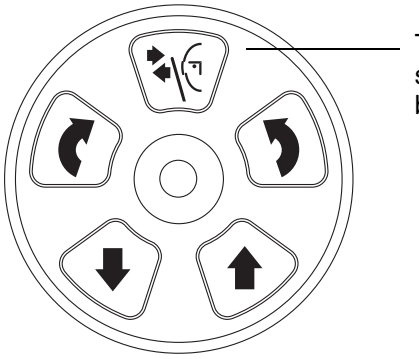
Guide the patient to the unit so that they are facing the chin support. Explain to the patient that you will take a multi-angle exposure and that the C-arm will move through three exposure cycles.



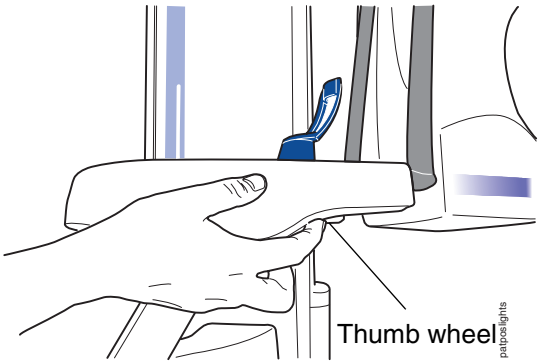
To adjust the height of the unit, press either of the height adjusting buttons until the opening in the chin support is approximately level with the patient’s mouth.

The telescopic column moves slowly at first, then faster.

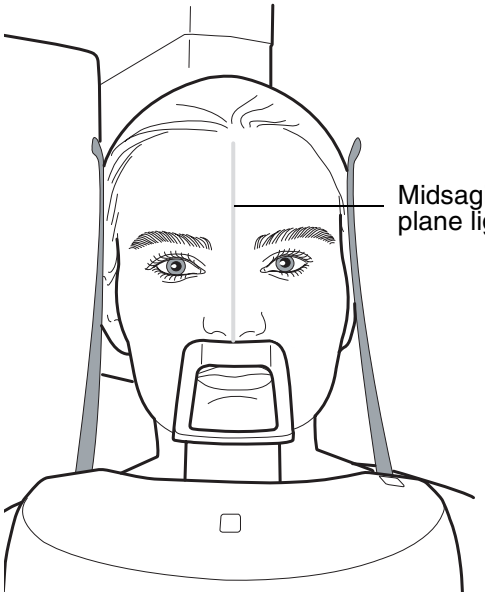
Ask the patient to step forward, grasp the patient handles and press their lips against the chin support. The patient's nose must rest on top of the support and their mouth must be closed, their teeth together.



Close the temple supports by pressing the temple support button.



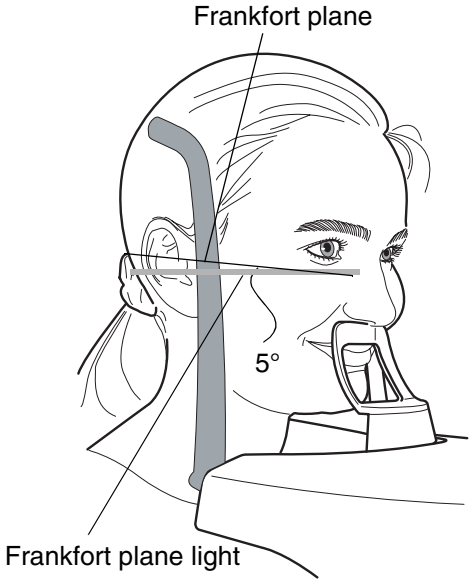
Move the thumb wheel that is located on the underside of the patient support table to switch on the patient positioning lights so that the patient can be positioned. Note that the lights will automatically switch off after 2 minutes. If the lights go out before you have positioned the patient move the thumb wheel again to switch the lights back on.



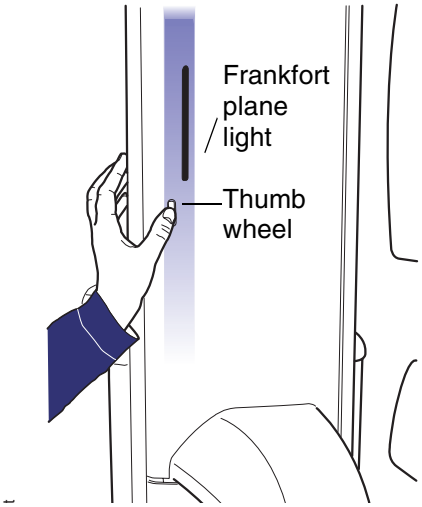
Stand behind the patient and check that the patient's shoulders are level and the neck muscles relaxed.

Position the patient's head so that the midsagittal plane coincides with the midsagittal plane light beam. Make sure that the patient is looking straight ahead as the light may appear to be correctly positioned but the patient's head could be turned slightly to one side.

Note that you can adjust the position of the temple supports if needed. This will only be necessary if the patient has an asymmetrical face and the midsagittal plane light is not in the middle of the patient's face. For more information, refer to page 69.



Position the patient's head so that the Frankfort plane is tilted down 5 degrees. To do this support the back of the patient's head with your hand and, using the Frankfort plane light as a reference line, adjust the position of the patient's head by raising or lowering the unit with the height adjusting buttons. Make sure the patient's back is straight.

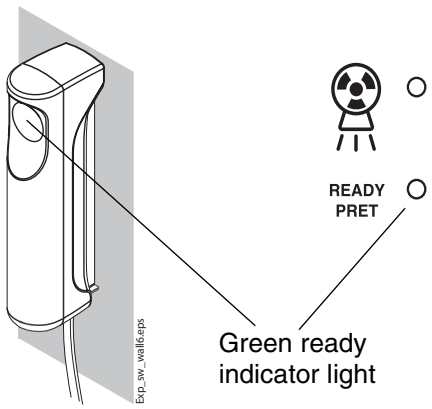


Note that the Frankfort plane light, located on the side of the column, can be moved up or down to accommodate different head sizes. This is done by rotating the thumb wheel that is located below the light slot.

NOTE ***Make sure that you have selected the right patient and the panoramic exposure mode in the Dimaxis software program before you take an exposure. Refer to the Dimaxis User's Manual.***

11.2.2 Taking an exposure

When you are ready to take an exposure touch the *Ready* field on the main display. The unit will move to the ready position for the selected multi-angle TMJ exposure program.

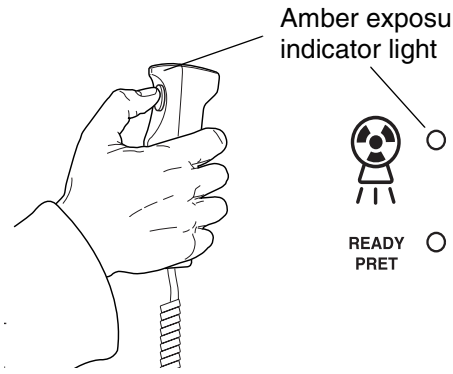


On the exposure button and control panel a green indicator light will come on. Additionally, the word READY will be shown on the control panel display. The Dimaxis program will show the *Waiting for Ready* message on the computer screen.

The green indicator lights and the word READY will flash while the unit moves to the ready position. They will stop flashing when the unit has reached the ready position for the selected multi-angle TMJ exposure program. The Dimaxis program will now show the *Waiting for Exposure* message on the computer screen.

Ask the patient to stand as still as possible.

Move to a protected area. In case you do not have a protected area available, move at least two meters (seven feet) from the X-ray. Protect yourself from radiation.



Press and hold down the exposure button for the duration of the exposure. The C-arm will move through three exposure cycles. The radiation warning lights on the exposure switch and on the control panel will come on and you will hear the radiation warning tone.

When the C-arm has completed the third exposure cycle the temple supports will automatically open. You can now guide the patient from the unit.

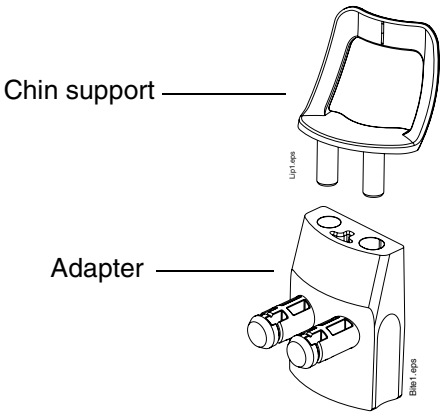
NOTE ***Maintain audio and visual contact with the patient and unit during exposure. If the C-arm stops moving during exposure, release the exposure button immediately.***

You can drive the C-arm to the entry position by touching the *Go Entry 1* or *Go Entry 2* field in the display.

NOTE ***If a large number of exposures is taken in rapid succession the X-ray tube may overheat and a cooling time will flash in the display (e.g. 00:42). The cooling time indicates the delay before the next exposure can be taken.***

When you have taken the exposure the image will be shown on the computer screen. **Note that you must accept the image by clicking the "OK" button - only accepted images will be stored in the database.** Refer to the Dimaxis User's Manual for further information.

12 SINUS EXPOSURE



This procedure will produce an exposure of the maxillary sinus along the plane selected.

Use the chin support for this exposure. Insert the chin support into the adapter. Insert the adapter into the holes in the patient support table.

Select the sinus program you require, refer to section 8.4 “Selecting sinus exposure program” on page 44.

Select the correct exposure parameters for the patient being X-rayed according to the values in the following tables. Note that the values depend on the selected sinus program.

NOTE ***If the required diagnostic value can be reached with lower mA values than the following table indicates, you can use those lower values. Always try to minimize the radiation dose to the patient.***

NOTE ***Increase the kV value in the enhanced resolution mode by 2 kV and the mA value by 2 mA.***

EXPOSURE VALUES
for sinus program “Sinus PA rot”

PATIENT	kV VALUE	mA VALUE
Child up to 6 years of age	72	6
Child 7-12 years of age	74	7
Adult female or small male	76	8
Adult male	78	9
Large adult male	80	10

EXPOSURE VALUES
for sinus program “Sinus PA nonrot”

PATIENT	kV VALUE	mA VALUE
Child up to 6 years of age	72	5
Child 7-12 years of age	74	6
Adult female or small male	76	7
Adult male	78	8
Large adult male	80	9

EXPOSURE VALUES
for sinus programs “Sinus Lat nonrot L”, “Sinus Lat nonrot R”, “Midsagit nonrot L” and “Midsagit nonrot R”

PATIENT	kV VALUE	mA VALUE
Child up to 6 years of age	60	4
Child 7-12 years of age	62	4
Adult female or small male	64	4
Adult male	66	5
Large adult male	68	5

NOTE ***When you have made all the necessary selections move the C-arm to the patient entry position if it is not already there.***

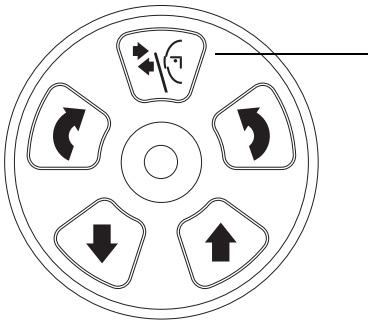
OR

Full view position

Traditional view position

Prepare the patient for the exposure as described in section 6.2 “Preparing the patient” on page 31.

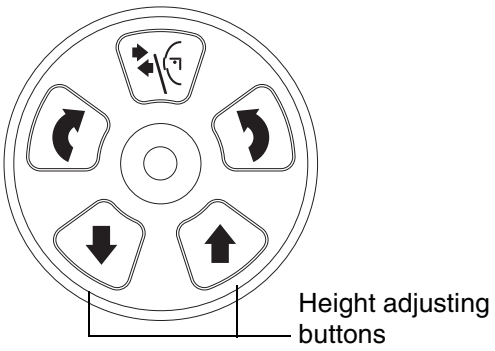
12.1 Patient positioning



Press the temple support button to open the temple supports if they are not already open.

The temple supports can be closed by pressing the temple support button again.

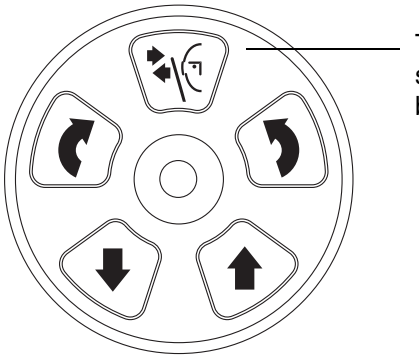
Guide the patient towards the unit so that they are facing the chin support.



To adjust the height of the unit, press either of the height adjusting buttons until the opening in the chin support is approximately level with the patient’s mouth.

The telescopic column moves slowly at first, then faster.

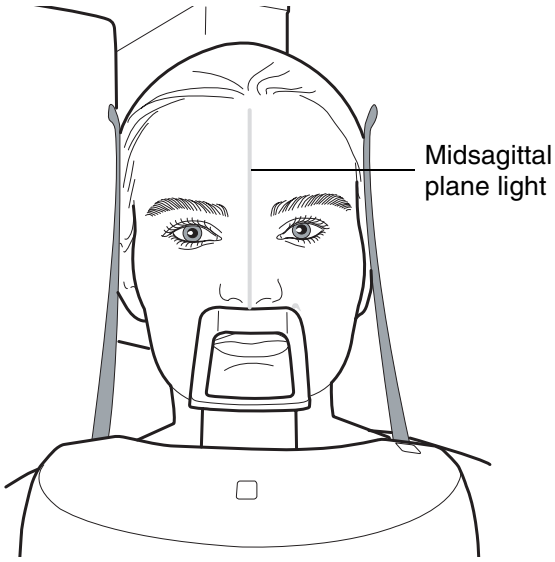
Ask the patient to step forward, grasp the patient handles and place their chin on the chin support. The patient's mouth must be closed.



Close the temple supports by pressing the temple support button.

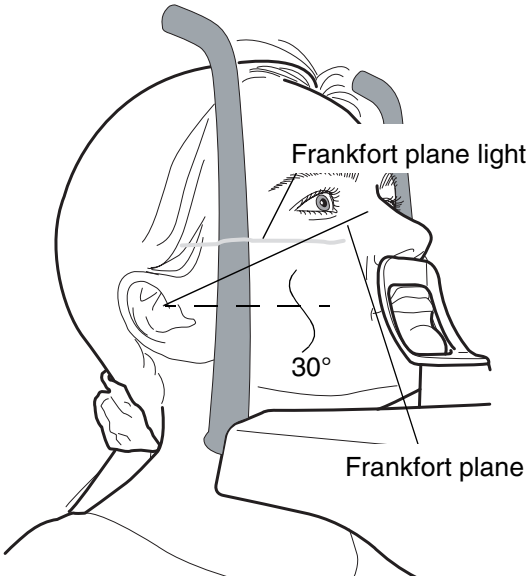
Move the thumb wheel that is located on the underside of the patient support table to switch on the patient positioning lights so that the patient can be positioned. Note that the lights will automatically switch off after 2 minutes. If the lights go out before you have positioned the patient move the thumb wheel again to switch the lights back on.

Stand behind the patient and check that the patient's shoulders are level and the neck muscles relaxed.



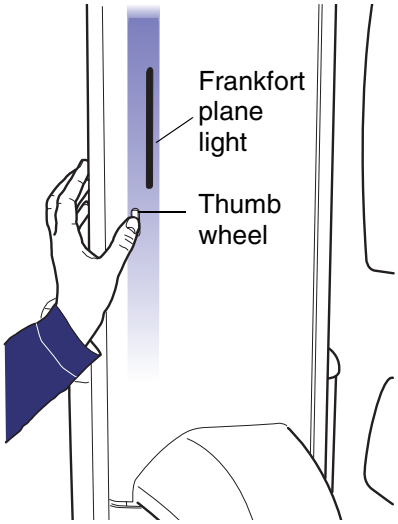
Position the patient's head so that the midsagittal plane coincides with the midsagittal light beam. Make sure that the patient is looking straight ahead as the light may appear to be correctly positioned but the patient's head could be turned slightly to one side.

Note that you can adjust the position of the temple supports if needed. This will only be necessary if the patient has an asymmetrical face and the midsagittal plane light is not in the middle of the patient's face. For more information, refer to page 69.



Position the patient's head so that the Frankfort plane is tilted up between 0 and 30 degrees depending on the build of the patient. To do this support the back of the patient's head with your hand and, using the Frankfort plane light as a reference line, adjust the tilt of the patient's head by raising or lowering the unit with the height adjusting buttons. The patient's back should be straight. If necessary stretch and straighten the patient's neck by moving the unit up slightly.

NOTE ***When necessary, take a test exposure without radiation to check that the patient's head does not hit the C-arm. Refer to section 8.6.3 "Special functions" on page 60 for information on how to switch the radiation off.***

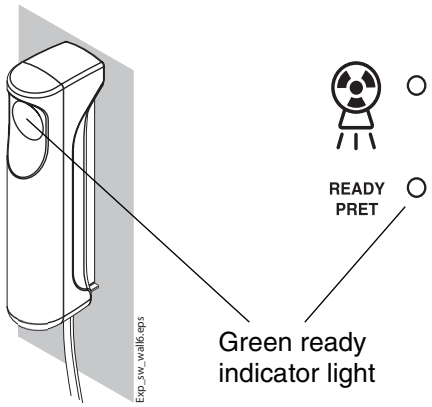


Note that the Frankfort plane light, located on the side of the column, can be moved up or down to accommodate different head sizes. This is done by rotating the thumb wheel that is located below the light slot.

NOTE ***Make sure that you have selected the right patient and the panoramic exposure mode in the Dimaxis software program before you take an exposure. Refer to the Dimaxis User's Manual.***

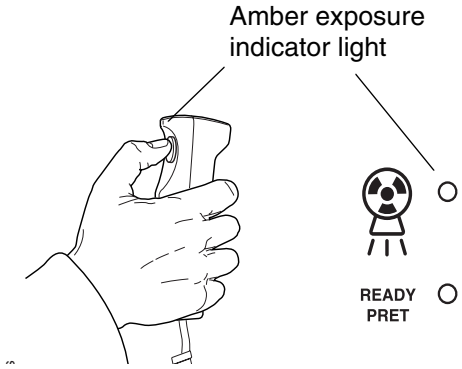
12.2 Taking an exposure

When you are ready to take an exposure touch the *Ready* field on the main display. The unit will move to the ready position for the selected sinus exposure program.



On the exposure button and on the control panel a green indicator light will come on. Additionally, the word *READY* will be shown on the control panel display. The Dimaxis program will show the *Waiting for Ready* message on the computer screen.

The green indicator lights and the word *READY* will flash while the unit moves to the ready position. They will stop flashing when the unit has reached the ready position for the selected sinus exposure program. The Dimaxis program will now show the *Waiting for Exposure* message on the computer screen.



Ask the patient to swallow and stand as still as possible.

Move to a protected area. In case you do not have a protected area available, move at least two meters (seven feet) from the X-ray. Protect yourself from radiation.

Press and hold down the exposure button for the duration of the exposure. The C-arm will move through one complete exposure cycle. During the exposure cycle the radiation warning lights on the exposure switch and on the control panel will come on and you will hear the radiation warning tone. When the C-arm has completed the exposure cycle the temple supports will automatically open. You can now guide the patient from the unit.

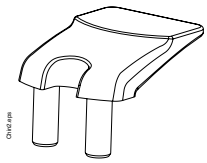
NOTE ***Maintain audio and visual contact with the patient and unit during exposure. If the C-arm stops moving during exposure, release the exposure button immediately.***

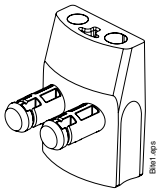
You can drive the C-arm to the entry position by touching the *Go Entry 1* or *Go Entry 2* field in the display.

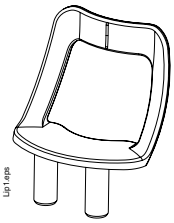
NOTE ***If a large number of exposures is taken in rapid succession the X-ray tube may overheat and a cooling time will flash in the display (e.g. 00:42). The cooling time indicates the delay before the next exposure can be taken.***

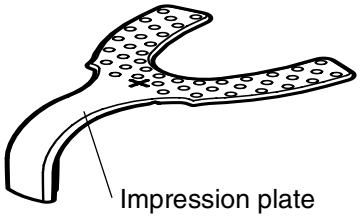
When you have taken the exposure the image will be shown on the computer screen. **Note that you must accept the image by clicking the "OK" button - only accepted images will be stored in the database.** Refer to the Dimaxis User's Manual for further information.

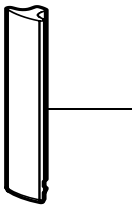
13 TOMOGRAPHIC EXPOSURE











In tomographic exposure programs tomographic and transtomographic images from maxilla, mandible or temporo-mandibular joints are taken. These images can be cross-sectional or longitudinal, and their angle can be adjusted.

There are two tomography methods available: digital tomography and digital transtomography. See chapter 5.4 “Tomographic exposure programs” on page 20 for more information.

Use a bite piece for this procedure. Insert the chin rest and a bite piece into the adapter. Insert the adapter into the holes in the patient support table.

For edentulous patients or for patients who are unable to use the bite piece, you can use the impression plate or bite piece with vacuum formed stent.

You can also use the bite impression model for patient positioning. See “Bite impression model” on page 97.

Select the tomographic (Tomo) exposure program you require and specify the image area as described in section 8.5 “Selecting tomographic (Tomo) exposure program” on page 46.

Select the correct exposure values for the patient being X-rayed according to the values in the following table.

NOTE ***If the required diagnostic value can be reached with lower mA values than the following table indicates, you can use those lower values. Always try to minimize the radiation dose to the patient.***

NOTE ***Increase the kV value in the enhanced resolution mode by 2 kV and the mA value by 1mA.***

CROSS-SECTIONAL DIGITAL TOMOGRAPHIC EXPOSURE VALUES

PATIENT	1-3 (Cuspid)		4-8 (Premolar/ Molar)		Condyle		PA Sinus	
	kV	mA	kV	mA	kV	mA	kV	mA
Child up to 6 years of age	60	2	64	5	62	4	64	5
Child	62	3	66	6	64	5	66	6
Adult female or small male	64	4	68	7	66	6	68	7
Adult male	66	5	70	8	68	7	70	8
Large adult male	68	6	72	9	70	8	72	9

LONGITUDINAL DIGITAL TOMOGRAPHIC EXPOSURE VALUES

PATIENT	1-3 (Cuspid Midsagittal plane)		4-8 (Premolar/ Molar)		Condyle		Lat Sinus	
	kV	mA	kV	mA	kV	mA	kV	mA
Child up to 6 years of age	64	5	64	5	62	4	64	5
Child	66	6	66	6	64	5	66	6
Adult female or small male	68	7	68	7	66	6	68	7
Adult male	70	8	70	8	68	7	70	8
Large adult male	72	9	72	9	70	8	72	9

CROSS-SECTIONAL DIGITAL TRANSTOMOGRAPHIC EXPOSURE VALUES

PATIENT	1-3 (Cuspid)		4-8 (Premolar/ Molar)		Condyle		PA Sinus	
	kV	mA	kV	mA	kV	mA	kV	mA
Child up to 6 years of age	60	1	62	1	62	1	64	1
Child	62	1	64	2	64	2	66	2
Adult female or small male	64	1	66	2	66	2	68	2
Adult male	66	1	68	3	68	2	70	3
Large adult male	68	1	70	3	70	2	72	3

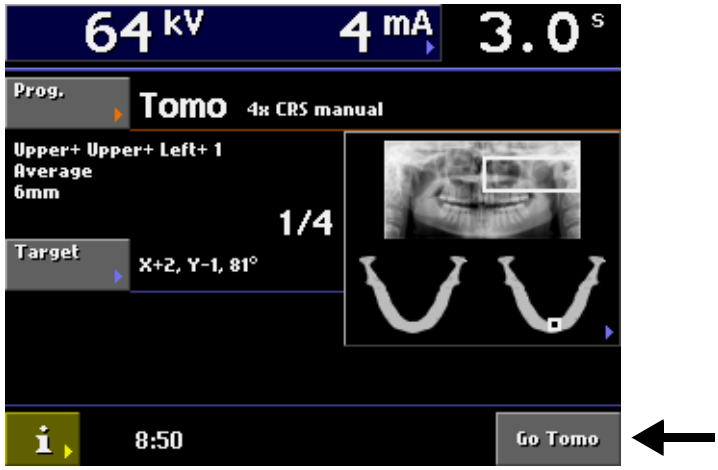
LONGIDUTINAL DIGITAL TRANSTOMOGRAPHIC EXPOSURE VALUES

PATIENT	1-3 (Cuspid Sinus area Midsagittal plane)		4-8 (Premolar/ Molar)		Condyle		Lat Sinus	
	kV	mA	kV	mA	kV	mA	kV	mA
Child up to 6 years of age	64	3	62	1	62	1	62	1
Child	66	3	64	2	64	2	64	2
Adult female or small male	68	3	66	2	66	2	66	2
Adult male	70	3	68	3	68	2	68	3
Large adult male	72	3	70	3	70	2	70	3

NOTE ***For mixed exposure programs, use the values given in the cross-sectional table. The kV value will be automatically reduced for longitudinal images.***

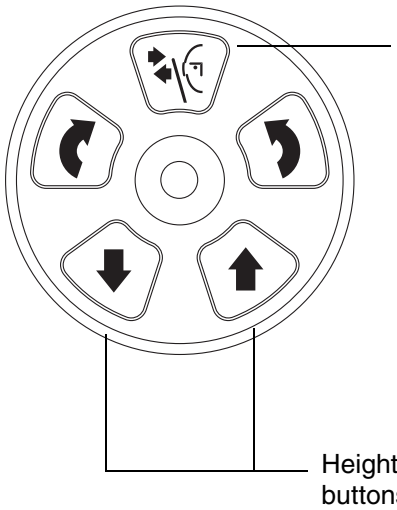
You can change the coordinates manually by touching the *Target* field.

When you have made all the necessary selections touch the *Go Tomo* field on the control panel main display to move the C-arm to the patient entry position if it is not already there.



Prepare the patient for the exposure as described in section 6.2 “Preparing the patient” on page 31.

13.1 Patient positioning



Guide the patient to the unit so that they are facing the chin rest. You may find it more convenient to position patients if they are seated.

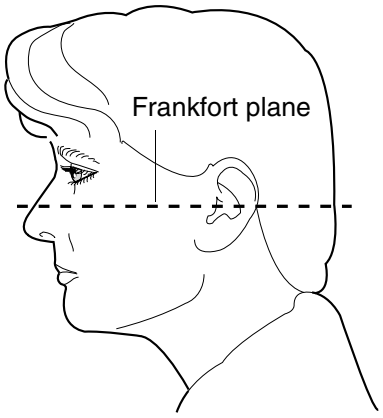
To adjust the height of the unit, press either of the height adjusting buttons until the chin rest is approximately level with the patient’s lower jaw.

The telescopic column moves slowly at first, then faster.

Ask the patient to grasp the patient handles. Open the temple supports by pressing the temple support button. Ask the patient to place their chin on the chin rest and bite the bite piece. Close the temple supports by pressing the temple support button.

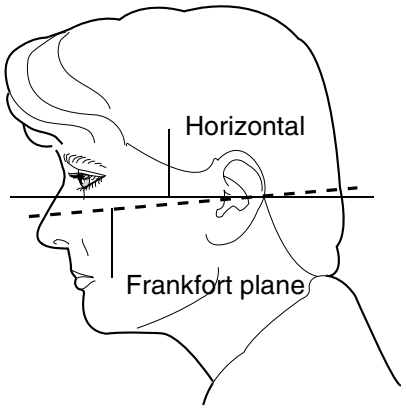
While gently supporting the back of the patient’s head with your hand press either of the height adjusting buttons to move the unit up or down so that the patient’s head can be tilted to the angle required for the exposure you wish to take.

Exposure of temporomandibular joints/sinus area/midsagittal plane



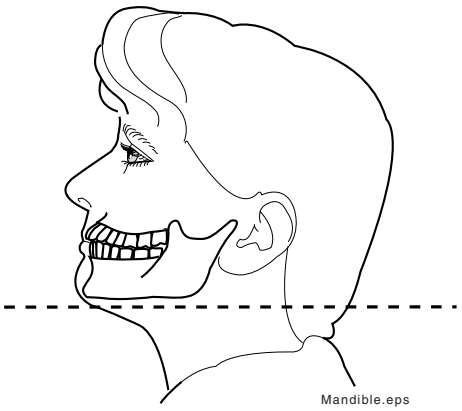
To take longitudinal or cross-sectional exposures of either of the **temporomandibular joints**, or longitudinal exposures of the **sinus area or midsagittal plane**, position the **Frankfort plane** so that it is horizontal.

Mandible/maxilla exposure (position 1-3 cuspid)



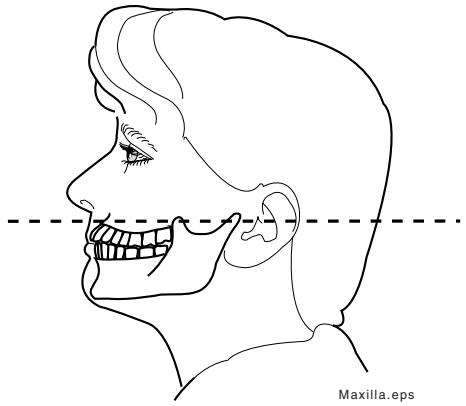
To take longitudinal and cross-sectional exposures of both **mandible and maxilla**, position the **Frankfort plane** so that it is horizontal or tilted down up to 5°.

Mandible exposure (position 4-8 premolar/molar)



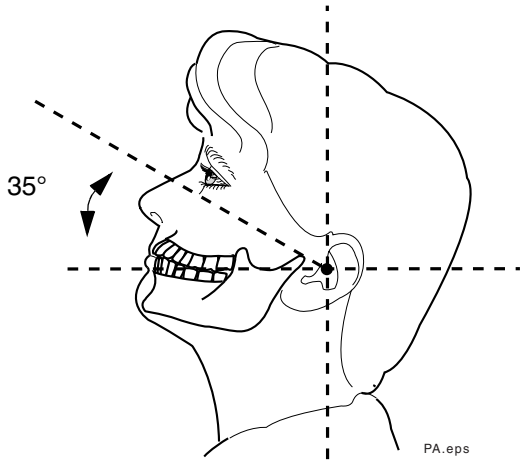
To take longitudinal or cross-sectional exposures of the **mandible**, position the **lower edge of the mandible** so that it is horizontal.

Maxilla exposure (position 4-8 premolar/molar)



To take longitudinal or cross-sectional exposures of the **maxilla**, position the **maxillary alveolar ridge** so that it is horizontal.

PA projection exposure



To take cross-sectional exposures of the **sinus area or midsagittal plane**, position the patient's head so that the **Frankfort plane** is tilted up about 35 degrees.

13.2 Adjusting the position of the target area

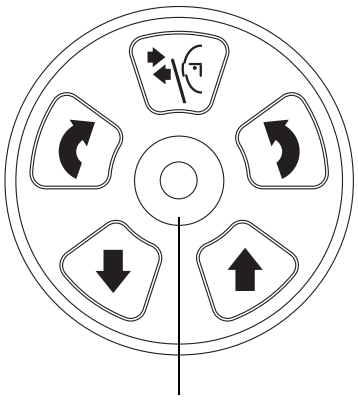
After selecting the target area coordinates and positioning the patient to the unit, the position of the target area must be checked.

If the patient positioning lights are not switched on, touch the panoramic layer adjustment wheel to switch them on.

The light beams cross at the target position. The position of the target area can be adjusted both crosswise and lengthwise, and the angle of the C-arm can be changed.

NOTE ***The optional midsagittal and Frankfort lights can be enabled and disabled in the Behavioural preferences menu i230.***

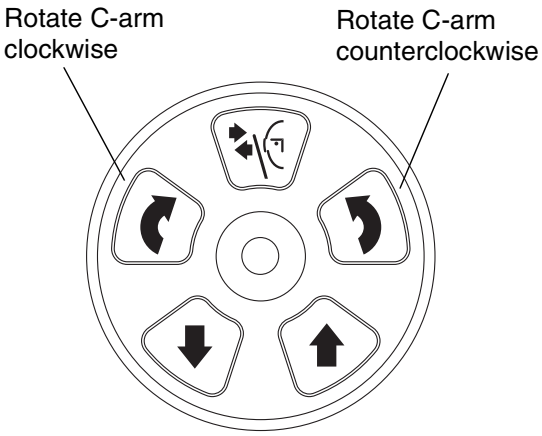
Patient positioning lights



Positioning joystick

To adjust the position of the target area, move the positioning joystick crosswise or lengthwise until the cross formed by the light beams is at the correct position for the exposure you wish to take. The coordinates of the selected position are shown on the control panel display.

Note that, if necessary, you can rotate the C-arm 90 degrees clockwise by touching the *90°* field on the control panel. This might give you a better view to the patient. Touching the *90°* field again will rotate the C-arm back to the original position.

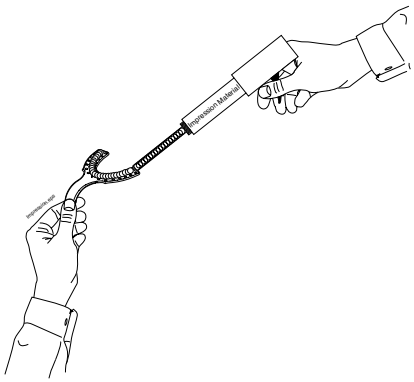


To adjust the angle of the C-arm, press either of the C-arm rotation buttons. Pressing the button on the left will rotate the C-arm clockwise, and pressing the button on the right will rotate the C-arm counterclockwise.

The C-arm angle is shown on the control panel display.

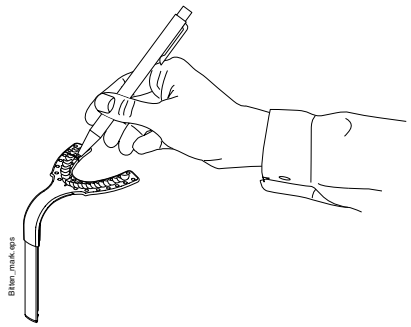
Bite impression model

You can also use bite impression model for linear tomographic exposures.

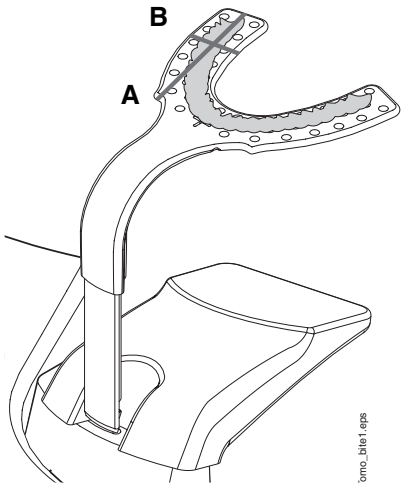


Spread bite registration paste either to the upper or the lower side of the bite impression model.

Ask the patient to bite the plate so that the anterior teeth coincide the cross line on the plate. The cross line indicates the position of the groove in the normal bite piece. The track of the dental arch is formed in the registration paste.



Mark the target area of the exposure on the registration paste with a pen.



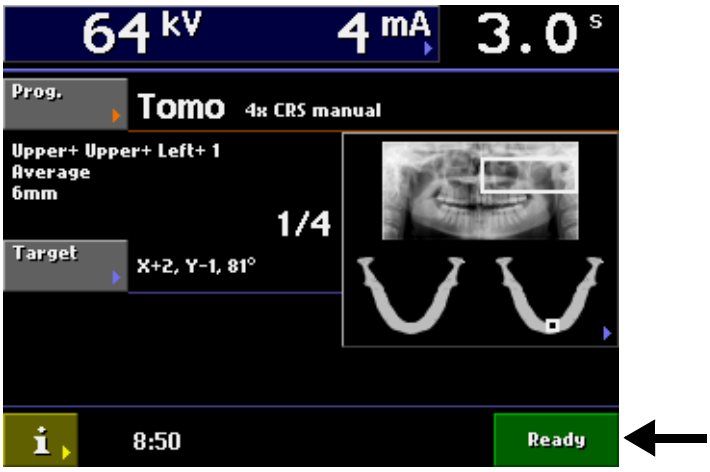
Insert the plate in its position. The lights form a cross which indicates the imaging position. The light B shows the layer direction (angle) and the light A shows the beam direction (angle). Adjust the lights to the target. The light B must be perpendicular to the jaw and the light A must be parallel to the tangent of the curve of the jaw.

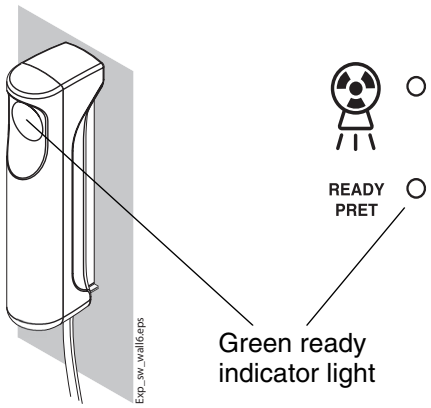
Position the patient in the unit. Ask the patient to bite the impression model.

NOTE ***Make sure that you have selected the right patient and the panoramic exposure mode in the Dimaxis software program before you take an exposure. Refer to the Dimaxis User's Manual.***

13.3 Taking an exposure

When you are ready to take an exposure touch the *Ready* field on the main display. The unit will move to the ready position for the selected exposure program.

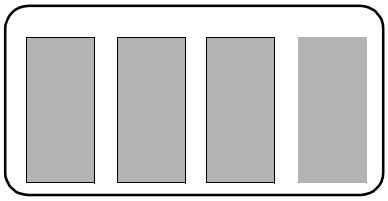




A green indicator light will come on on the exposure button and on the control panel. Additionally, the word *READY* will be shown on the control panel display. The Dimaxis program will show the *Waiting for Ready* message on the computer screen.

The green indicator lights and the word *READY* will flash while the unit moves to the ready position. They will stop flashing when the unit has reached the ready position for the selected exposure program. The Dimaxis program will now show the *Waiting for Exposure* message on the computer screen.

Manual exposure



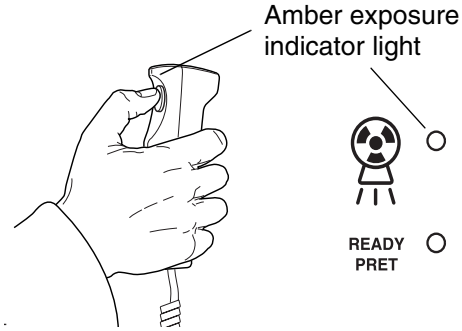
In manual exposure programs you can decide how many exposures you wish to have in one image. The minimum is one and the maximum is four.

Between each exposure you can manually:
- change the image area
- change the exposure values (mA and kV)
- change the angle of the C-arm
- change the position of the patient.

NOTE ***If you have already pressed Ready and wish to make changes you must press Ready again after you have made the changes.***

For example, stereopair images can be taken by changing the C-arm angle.

Ask the patient to close their lips on the bite piece, swallow, and remain as still as possible. Tell the patient how many exposures you will take so that they do not move before the end of the exposure cycle.



Move to a protected area. In case you do not have a protected area available, move at least two meters (seven feet) from the X-ray. Protect yourself from radiation.

Press and hold down the exposure button for the duration of the exposure. The C-arm will move through one complete exposure cycle. During the exposure cycle the radiation warning lights on the exposure switch and on the control panel will come on and you will hear the radiation warning tone. The C-arm will stop and wait for you to take the next exposure.

NOTE ***Maintain audio and visual contact with the patient and unit during exposure. If the C-arm stops moving during exposure, release the exposure button immediately.***

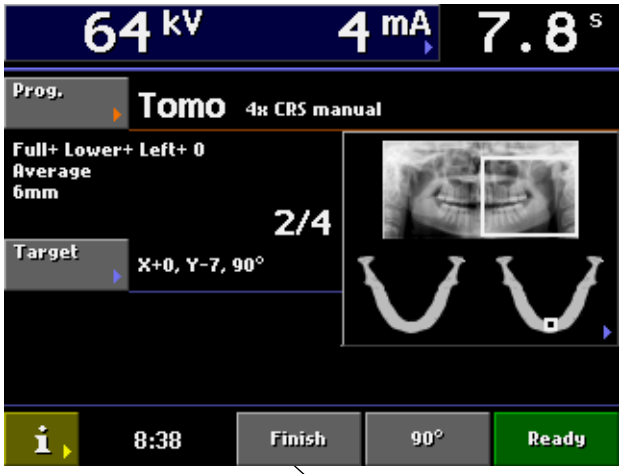
Before taking another exposure make any adjustment necessary to the exposure parameters or adjust the position of the patient's head or the C-arm. Take the next exposure in the same way as described above.

NOTE ***If a large number of exposures is taken in rapid succession the X-ray tube may overheat and a cooling time will flash in the display (e.g. 00:42). The cooling time indicates the delay before the next exposure can be taken.***

When you have taken the number of exposures that you require open the temple supports and guide the patient from the unit. Note that you may have to move the C-arm before the patient can be guided from the unit. To turn the C-arm press the *90°* button.

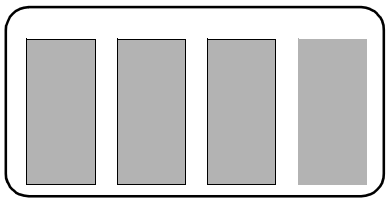
The image will be shown on the computer screen. Refer to the Dimaxis User's Manual for further information.

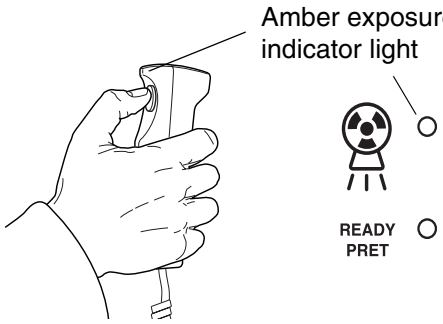
In manual exposure mode you can stop the exposure procedure **by touching the *Finish* field.**



Touch here to stop the exposure

Automatic exposure





In automatic exposure programs you will get three or four exposures in one image depending on the program you use.

Ask the patient to close their lips on the bite piece, swallow, and remain as still as possible. Tell the patient that the C-arm will rotate backwards and forwards three (or four) times so that they do not move before the end of the exposure cycle.

Move to a protected area. In case you do not have a protected area available, move at least two meters (seven feet) from the X-ray. Protect yourself from radiation.

Press and hold down the exposure button for the duration of the exposure cycle. The C-arm will rotate backwards and forwards three (or four) times. During the exposure the radiation warning lights on the exposure switch and on the control panel will come on and you will hear the radiation warning tone.

You can release the exposure button **between** the exposures. If you release the button **during** the exposure the program will be interrupted.

NOTE ***Maintain audio and visual contact with the patient and unit during exposure. If the C-arm stops moving during exposure, release the exposure button immediately.***

At the end of the exposure cycle open the temple supports and guide the patient from the unit. Note that you may have to move the C-arm before the patient can be guided from the unit. To move the C-arm press one of the C-arm rotation buttons.

NOTE ***If a large number of exposures is taken in rapid succession the X-ray tube may overheat and a cooling time will flash in the display (e.g. 00:42). The cooling time indicates the delay before the next exposure can be taken.***

The image will be shown on the computer screen. **Note that you must accept the image by clicking the "OK" button - only accepted images will be stored in the database.** Refer to Dimaxis User's Manual.

14 CLEANING

NOTE ***When disinfecting the unit surfaces, always disconnect the unit from mains.***

The bite pieces, chin support, chin rest, temple supports and cephalostat temple supports can be autoclaved up to 135°C or cleaned with alcohol-based solutions.

Other unit surfaces, including the touchscreen, can be cleaned with a soft cloth damped in a mild cleaning solution.

15 SERVICE

To guarantee user and patient safety and to ensure image quality the unit must be checked and recalibrated by a qualified PLANMECA service technician once a year or after every 10 000 exposures if this is sooner. Please refer to the **Planmeca ProMax Technical Manual** for complete servicing information.

16 DISPOSAL OF THE UNIT

In order to reduce the environmental load over the product's entire lifecycle, PLANMECA's products are designed to be as safe as possible to manufacture, use and dispose of.

Parts which can be recycled should always be taken to the appropriate processing centres, after hazardous waste has been removed. Disposal of obsolete units is the responsibility of the waste possessor.

All parts and components containing hazardous materials must be disposed of in accordance with waste legislation and instructions issued by the environmental authorities. The risks involved and the necessary precautions must be taken into account when handling waste products.

Disposal of ProMax X-ray unit and Dimax3 sensor head
X = action, (X) = action in cases where processing is available

Part	Main materials for disposal	Recyclable material	Waste disposal site	Hazardous waste (separate collection)
Frame and covers - metal - plastic	 Aluminium, galvanized steel, lead PUR, other plastics	 X X X	 X	 X
Motors		(X)		
Component boards		(X)		
Cables, transformers	Copper, steel, transformer oil	X X	X	
X-ray tube				X
Packing	Wood, cardboard, paper, polystyrene	X X X X		
Sensor head	Return sensor head to Planmeca.			
Other parts			X	

17 HELP MESSAGES

The following is a list of the help messages. These messages appear in the display if you are using the unit incorrectly, or if the function is not allowed for some reason. The help message disappears automatically when the situation is corrected, e.g. the pressed key is released.

Help code	Explanation		Comments
H101	**Exposure switch**	released before end of exposure	Exposure interrupted.
H102		continuously depressed or cable short circuited	Exposure not possible.
H141	**Height movement**	stopped due to the column emergency stop switch activation (plate)	
H142		stopped due to interference with an external object (former nut switch)	
H143		not possible because the (optional) STOP switch is activated	
H151	**Line voltage**	dropped too low during the exposure	Exposure interrupted.
H152		is too low	Exposure not possible.
H161	**Temperature**	of tube head too high	Exposure not possible before cooled down.
H162		of lift motor too high	Lift motor cannot be run before cooled down.
H163		of the power supply heatsink too high	Exposure not possible before cooled down.
H171	**User handled features**	Dimax3 sensor head not installed properly to C-arm	
H172		Dimax3 sensor head not installed properly to cephalostat	
H175		PC program selection in conflict with selected ProMax program	
H176		Safety area limit violation in tomography mode. Change layer thickness, position or angle	
H177		One or more image layers will not be exposed with these settings	
H178		Imaging impossible with selected settings	
H179		Enter cassette number.	
H180		AEC not available.	

18 TECHNICAL SPECIFICATIONS

NOTE CHECK TECHNICAL MANUAL FOR USER'S STATEMENT

18.1 Technical data

Generator	Constant potential, microprocessor controlled operating frequency 80 kHz complies with the standard IEC 601-2-7/1987	
X-ray tube	Toshiba D-054SB-P	
Focal spot size	0.5 x 0.5mm according to IEC 336	
Total filtration	min. 2.5 mm Al	
Anode voltage	Panoramic Tomographic Cephalometric	54 - 84 kV ±5% 50 - 80 kV ±5% 60 - 84 kV ±5%
Anode current	Panoramic Tomographic Cephalometric	1 - 16 mA ±10% 1 - 16 mA ±10% 1 - 16 mA ±10%
Exposure time	Panoramic Tomo Transtomo Cephalometric Normal: High speed:	2.5 - 16 s as indicated ±10% 4 - 12 s as indicated ±10% 24 - 95 s as indicated ±10% 12 - 18.7 s as indicated ±10% 6 - 9 s as indicated ±10%
SID	Panoramic and Tomographic 500 mm (20") Cephalometric 170 cm (63-67 in.)	
Magnification	Panoramic Tomographic Cephalometric	constant 1.2 constant 1.5 constant 1.13
CCD pixel size	33 µm	
Image pixel size	99/130 µm	
CCD active surface	Panoramic 9 x 136 mm Cephalometric 9 x 230 mm	
Image field	Panoramic 14 x 30 cm (5.5 x 12 in.) Cephalometric 27 x 18/27 cm (11 x 7/11 in.)	
Line voltage/	100-132 / 50 or 60 Hz 180 - 240 V~ / 50 Hz	
Line current	8 - 15 A	
Fusing	8A FF 500 VAC at 180 - 240 V~ 16A FF 500 VAC at 100 -132 V~	
Electrical classification	Class I, type B	
Weight	119 kg (263 lbs) 137 kg (304 lbs) with Cephalostat	
Color	White, RAL 9016	
Cooling period	Automatically controlled	

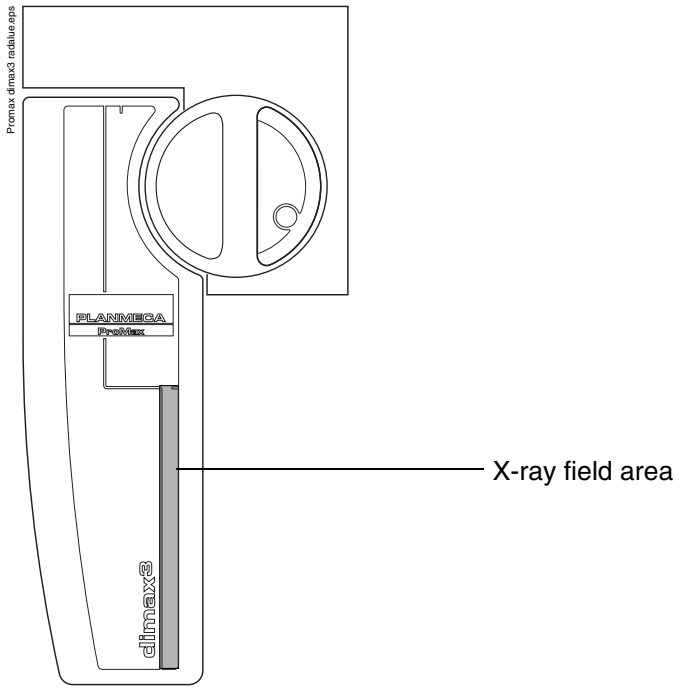
Environmental requirements

Ambient temperature	Operating +5°C to +40°C (41°F - 104°F) Storage -10°C to +50°C (14°F - 122°F)
Humidity	15% - 85%

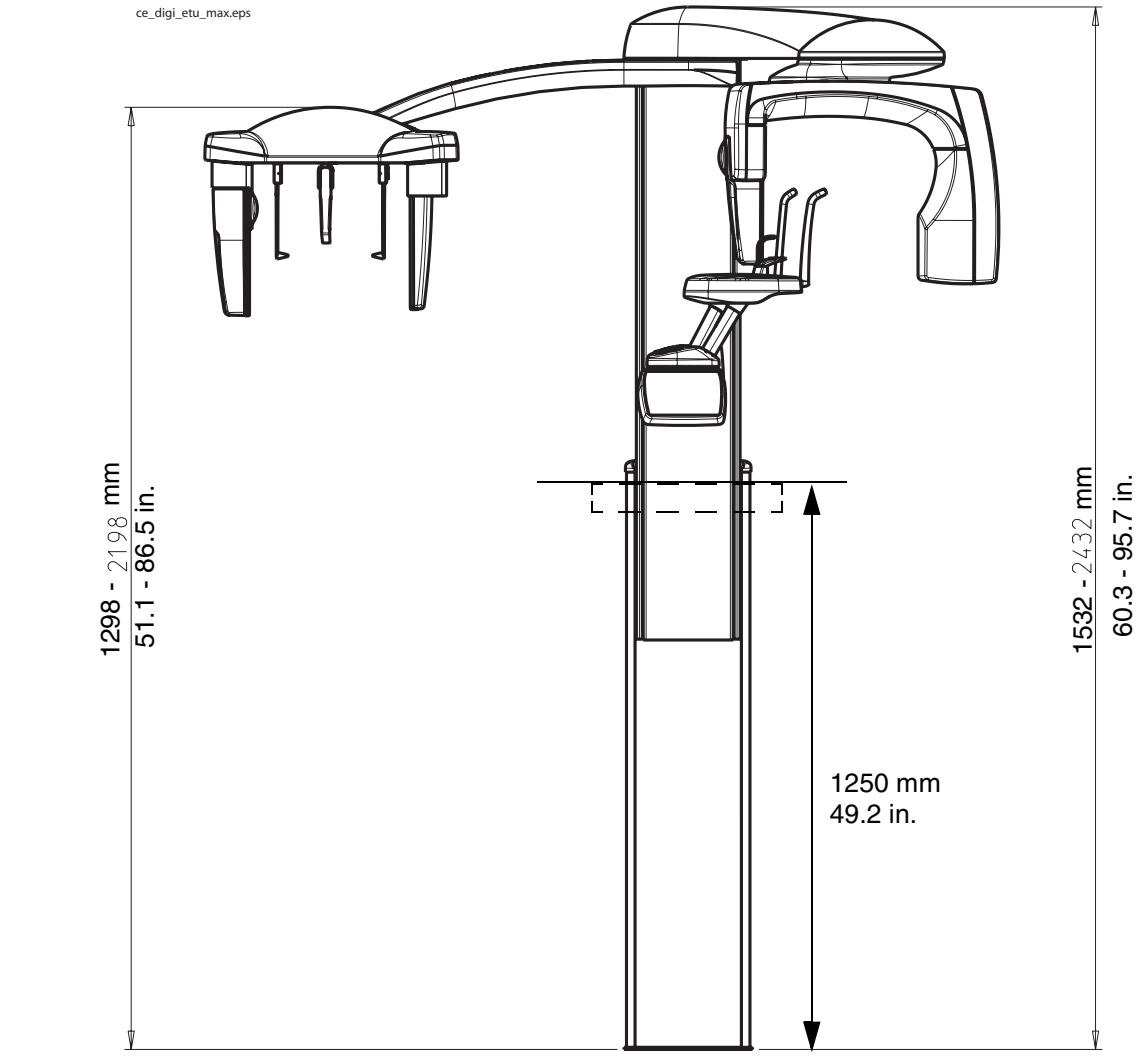
Original manufacturer

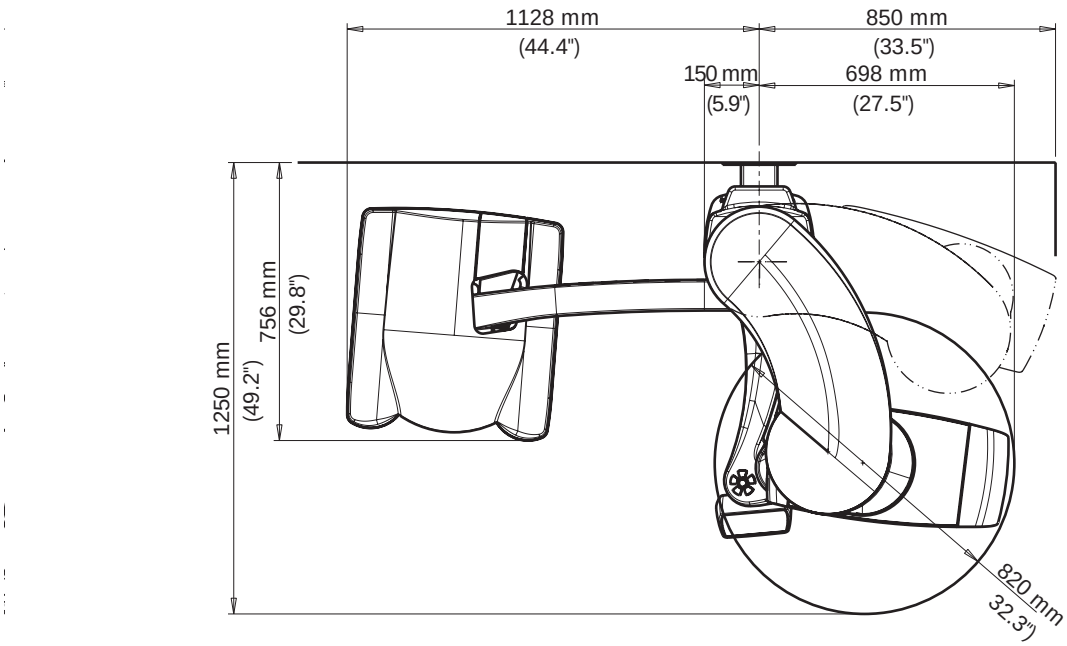
PLANMECA Oy, Asentajankatu 6, FIN-00880, Helsinki, FINLAND
phone: +358-20-7795 500, fax: +358-20-7795 555

18.2 Panoramic X-ray field area on image sensor



18.3 Dimensions





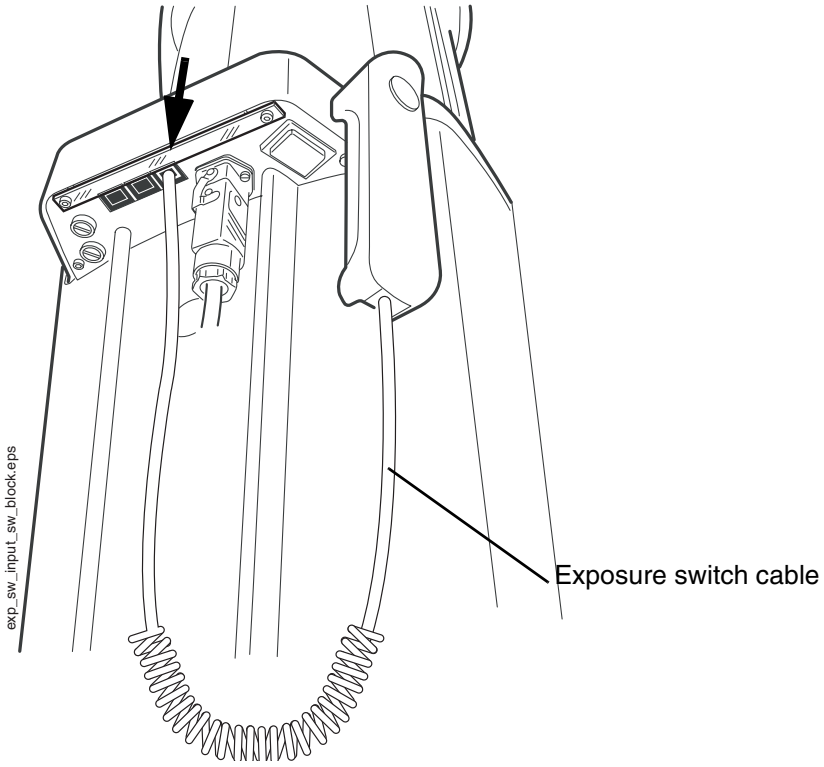
18.4 Minimum operational space requirements

The following table shows the minimum operational space requirements.

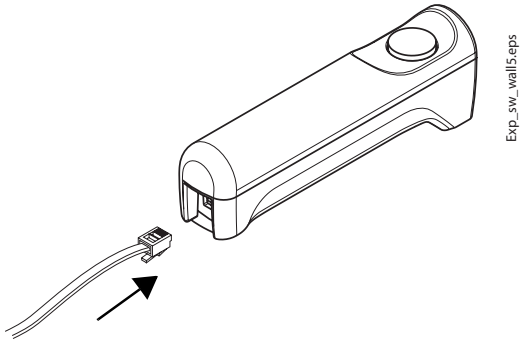
Equipment	Width	Depth	Height
Planmeca ProMax X-ray unit	1500 mm 59 in.	1630 mm 64 in.	1530 - 2430 mm 60 - 96 in.
Planmeca ProMax X-ray unit with Cephalostat	2150 mm 85 in.	1630 mm 64 in.	1530 - 2430 mm 60 - 96 in.

18.5 Connecting the exposure switch cable

Connect the exposure switch cable to the right hand side terminal on the underside of the stationary column top.



Connect the other end to the exposure switch.



18.6 Ethernet link configuration

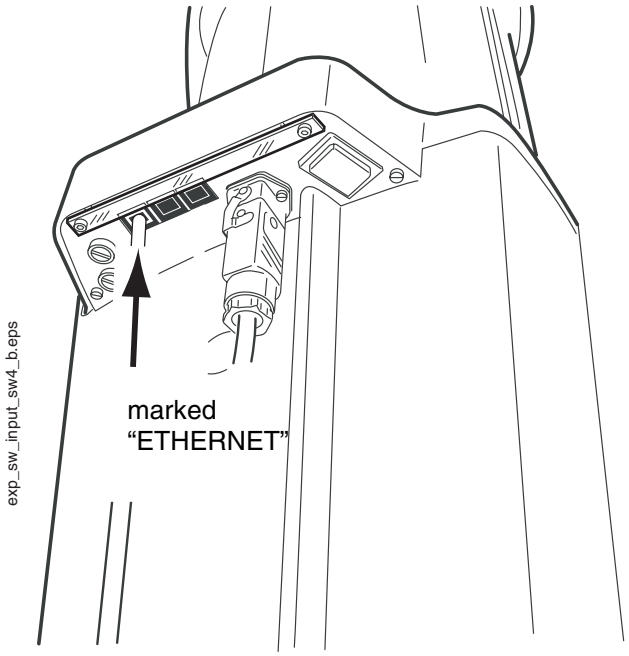
Direct connection usage

The ProMax unit is connected to the PC and can be controlled with the Dimaxis Pro/Classic imaging software (from the software version 3.2.3). In this case an Ethernet Crossover cable (10009912) is used to connect the ProMax to the PC.

Remote connection usage

The ProMax unit is connected to the 10/100 Base network and used from a Remote PC with the Dimaxis imaging software. In this case a UTP cat5e cable (0630200600) is used to connect the ProMax to the 10/100 Base Network. The Remote PC is connected to the Base Network with a 10/100 Base UTP connection cable to the Ethernet card of the PC.

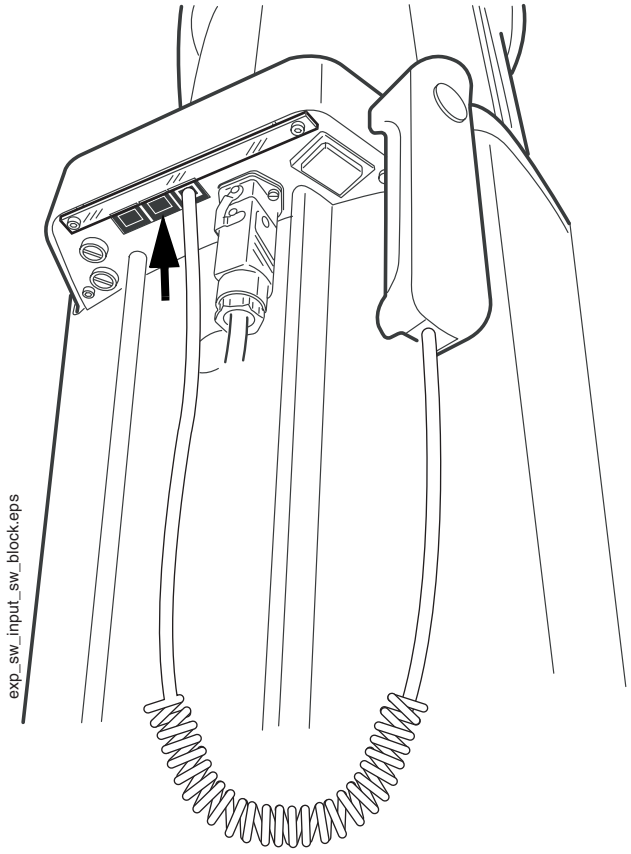
Depending on the connection usage the Interconnection cable (06320060) or the Ethernet Crossover cable (100009912) is attached to the left terminal (marked “ETHERNET”) at the underside of the stationary column top.



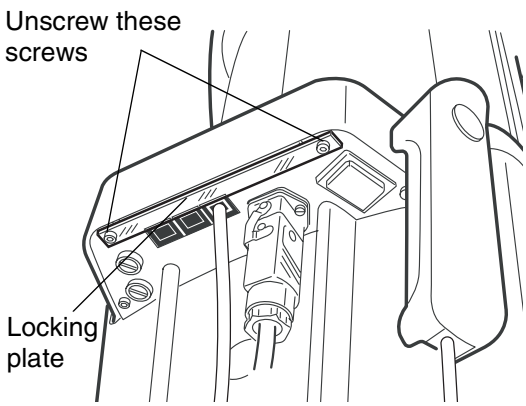
18.7 Connecting the external control panel cable (optional)

An optional external control panel can be mounted on a radiation protection screen, for example. This will allow you to simultaneously monitor the messages on the control panel while taking an exposure. When taking double or multiple exposures, the external control panel enables you to conveniently change any parameter settings between exposures, if needed.

The cable of the external control panel is connected to the middle terminal on the underside of the stationary column top.



18.8 Disconnecting cables



In case you need to disconnect any of the cables connected to the terminal on the underside of the stationary column top, the locking plate must be removed.

Remove the locking plate by unscrewing the two **M4X12 DIN7984** screws on the plate with a 2.5 mm Allen key.

PLANMECA

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